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ABSTRACT

After a brief introduction to cognitive psychology, this paper provides a set of principles from cognitive psychology, information processing theory, and constructivist psychology; outlines examples of the existence and often longtime, conscious use of contemporary cognitive psychology assumptions and conceptions in the social and behavioral science disciplines; states practical applications of selected constructs and assumptions for learning and instruction in the social science disciplines and in social studies classrooms; and describes, briefly, why a failure to comprehend, accept, and use these conceptions and principles may interfere with student attainment of the desired outcomes of social studies education--as well as interfere with student success in attaining and using these perspectives of "knowing" and "inquiry" advocated by social scientists. Presently, social studies educators have no viable alternative to accepting a cognitive psychology perspective relative to thinking, learning, functioning, and acting as human beings in the world. There currently is no viable alternative to notions concerning human thinking, learning, and acting generated from the cognitive psychological perspectives. Contains over 100 references. (LAP)

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Cognitive Psychology and *Constructivism*: Concepts, Principles and Implications Within The Social Science Disciplines and Applications for Social Studies Education

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Cognitive Psychology and *Constructivism*: Concepts, Principles and Implications Within The Social Science Disciplines and Applications for Social Studies Education

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Social studies is the *integrated study of the social sciences and Humanities to promote civic competence* (National Council for the Social Studies, 1994: p. vii). To this end, social studies educators expect students to acquire the knowledge, abilities and orientations which will enable them to (a) interact effectively with one another, with their past, and with their heritage; (b) apply appropriate concepts to analyze and explain social, economic, environmental and historical events; (c) grow in their ability to explain social phenomena, particularly in answering questions of how and why; and (d) attain and refine problem solving abilities by applying functional procedures and heeding appropriate rules and standards. Students are expected to become "enlightened citizens" who engage in proactive activities to contribute positively to their society, culture, and social institutions (Bragaw & Hartoonian, 1988; Hartoonian, 1990; Oliver, 1983). Social studies educators also expect students to learn and apply orientations which will enable them to function successfully in our own pluralistic society (Bragaw, 1986; Butts, 1979; Hartoonian & Laughlin, 1989; Marker, 1980; Mehlinger & Davis, 1981; Nelson, 1985; Parker, 1989; Task Force on Scope and Sequence, 1989; Superka & Hawke, 1980) and increasingly global community (Freeman, 1987; Hanvey, 1978; Kniep, 1986; 1989; Task Force on Scope and Sequence, 1989).

To make the major expectations of a sound social studies education clear, the National Council for the Social Studies (1994) approved a set of Curriculum Standards for the field, standards that made explicit the "expectations of excellence" for what students were to achieve and what the major focus of social studies education programs in every classroom, department, school and school district should be.

In order to attain and maintain the knowledge bases, abilities, attitudes, and orientations associated with these valued social studies and social science goals and expectations, students need to construct and use appropriate sets of information, use this information in appropriate ways in particular situations, and accept this information and its complementary conceptions and perspectives in high priority so that students use them to guide their decisions and actions. Furthermore, students must use these to make sense of and assign meaning both to what they encounter in the world and about themselves and their society. While educators have been concerned with what students ought to achieve and be like as a result of social studies instruction, they have not been so concerned with what may and needs to occur *inside each learner* so that these expectations are realized for nearly all students nearly all of the time (Stahl, 1995).

Theories and research associated with cognitive psychology as well as with the physiology of the human brain provide useful insights and explanations to pursue valued social studies student goals (Anderson, 1990; Neisser, 1976; Hart, 1983; Stahl, 1992a,b; Weinstein & Mayer, 1986; Wittrock, 1978, 1986). Educators in various fields such as mathematics (Schoenfeld, 1986; Vobejda, 1987), reading (Anderson, 1984), and science (Novak, 1980; Treagust, 1984, 1988; Driver & Erickson, 1983; Shuell, 1987; Vlahov and Treagust, 1988) have already derived useful constructs and principles from this theory and research base. These educators view learning and cognitive growth in terms of what seems to occur inside all learners. Their view focuses on what occurs inside the individual learner in contrast with traditional views which emphasize what is to be provided externally to learners. Martorella (1983), Torney-Purta (1991), and Stahl (1980, 1988a,b) have suggested how social studies educators can tap this body of concepts and principles to increase student learning.

Meanwhile, assumptions and conceptions associated with cognitive psychology, information processing and schemata theory, and constructivist psychology are, and have been, used and advocated by many social scientists regardless of whether their users were (or are) conscious of the fact that their thinking was (or is) consistent with these assumptions and conceptions. In part this use phenomena is due to the relative short life span of the formal field of cognitive psychology, but is largely due to a core phenomena of human intelligence, thought, and being itself: i.e., much of what constitutes humanness and human intelligence within the brain does appear to function in the ways cognitive psychology now describes. Hence, whether or not we invented the cognitive psychology view this very day, centuries ago, or in the past three decades, the brain and human thought has operated and still would operate in ways compatible with many major conceptions associated with cognitive psychology. Put in another way, just as objects in the universe interacted with and were affected by what we call "gravity" long before Newton provided us with a set of principles and concepts to use to describe, explain and predict movements of objects relative to "gravity;" even before cognitive psychology emerged as a formal field of thought, each human being, as an intelligent being functioning biologically and mentally in the world, is believed to operate internally in ways that are just now being described and explained by cognitive psychologists.

This of course is not to be construed to mean that every conception and assumption that emerges from the collective field of cognitive psychology is equally viable and is to be accepted without question and then followed.

The Position Taken In This Paper

The position taken in this paper, a position first stated in 1991 by this author, is that presently social studies educators have no viable alternative to accepting a cognitive psychology perspective relative to thinking, learning, functioning and acting as human beings in the world. Furthermore, *we currently have no viable alternative to notions concerning human thinking, learning, and acting generated from the cognitive psychological perspectives.* However, this is not to mean that every approach, conception, and principle proposed from this field is necessarily viable, of equal worth, and easily applicable to teaching and learning in the social studies.

One alternative to the cognitive psychology view, that must be rejected outright, is one that assumes the learner is born with a blank slate upon which is recorded and stored ideas, experiences, etc. that are absorbed via encounters with the world, including those meanings "transferred to" them by others. A second alternative would claim (a) that each and every human inherits all "knowledge," "values," "feelings," and so forth; (b) that these are stored in one's genes and biological being to emerge throughout life as pre-programmed; and (c) that one's thoughts, feelings, beliefs, and actions are merely the results of these innate programs carrying out their functions to guide biological-psychological development and maturation. Were this alternative view the actual case, humans would not and could not acquire anything new, such as having original, non-preprogrammed thoughts. There is no credible scholar that would claim this situation exists for humans - or ever existed for humans.

A third option, that associated with "classical" or "radical" behaviorism, claims that humans act in light of acquired, prior stimulus-response-feedback-reward associations and experiences (Skinner, 1938, 1953, 1974). This view holds that except to form new associations, humans do not and cannot make decisions outside the associations and behavioral patterns that are formed via past experiences. The conception of a "mind" or of a human as a "thinking" (i.e., "cognitive") organism is rejected in this perspective. While a number of psychologist still adhere to these notions, beginning in the mid-1960s many of their colleagues joined the modern "cognitive revolution" spearheaded by Bruner (1963), Neisser (1967), Ausubel (1963, 1968) and Bandura (1968).

Overview

After a brief introduction to cognitive psychology, this paper:

a) provides a set of principles from cognitive psychology, information processing theory, and constructivist psychology;

b) provides examples of the existence and often long time, conscious use of contemporary cognitive psychology assumptions and conceptions in the social and behavioral science disciplines, even though these disciplinary perspectives emerged prior to widely-published formal cognitive scientific perspectives;

c) states practical applications of selected constructs and assumptions for learning and instruction in the social science disciplines and in social studies classrooms; and

d) describes, briefly, why a failure to comprehend, accept, and use these conceptions and principles may interfere with student attainment of the desired outcomes of social studies education -- as well as interfere with student success in attaining and using these perspectives of "knowing" and "inquiry" advocated by social scientists.

The constraints of a paper will necessarily limit the extent to which each of these topics is elaborated. In addition, these four areas are such that they cannot be treated in all instances as though they were mutually exclusive domains. For the sake of clarity and brevity, information relevant to one topic will be integrated where appropriate in the elaborations of the other target areas.

COGNITIVE PSYCHOLOGY AND "CONSTRUCTIVISM"

What Is Included in Present-Day "Cognitive Psychology"?

A cognitive perspective is the major viewpoint within present-day psychology and educational psychology. However, as with many of its constructs and principles, the boundaries and orientation of this perspective are not agreed upon even among its supporters. The definitions below reflect a sample of the definitions that are being used to define the field:

- Cognitive psychology is the scientific study of mental processes or mental events (Gagne, 1985: pp. xii, 1).

- Cognitive psychology attempts to understand the nature of human intelligence and how people think (Anderson, 1990: p. 1) as well as the basic mechanisms governing human thought. These basic mechanisms are important to understanding the types of behavior studied by other social science fields (p. 4).

- Cognitive psychology is a theoretical perspective that focuses on the realms of human perception, thought and memory. . . . [and that] portrays learners as active processors of information--a metaphor borrowed from the computer world--and assigns critical roles to the knowledge and perspective students bring to their learning. (Bruning, Schraw & Ronning, 1995: p. 1).

- Cognitive science is a multidisciplinary field of inquiry and activity whose focus is the origins, development, and nature of intelligence in organisms of all kinds, even in machines (Bannon, 1990). This activity includes official and unofficial segments of such disciplines as psychology, linguistics, biology, anthropology, neurophysiology, philosophy, and computer

> science. A key activity is to distinguish the physical events, actions and functions of an organism from the underlying and internal "mechanisms" that would generate these physical phenomena. In humans the 'underlying mechanisms" are largely associated with and assumed to occur within the brain.

In one sense, cognitive psychology is that subfield of psychology [and that group of psychologists] whose area of concern includes the search for, descriptions, and explanations of assumed unobservable internal "mechanisms" of intelligence, learning, and functioning.[1] Information processing theorists, who may but need not view themselves or be viewed as cognitive psychologists, operate under the assumption that the human being is an intelligent system and therefore engages in intelligent activity by processing and manipulating symbols (and information).[2] Constructivist theorists are primarily concerned with the human as "knower," "sense maker," and "meaning maker." At the same time, being a constructivist does not automatically mean that one must accept the notion that the human is an information processing being. While one could integrate the major conceptions of these three areas of cognitive psychology, it should not be assumed that adherence to one area automatically commits a person to either one or both of the other areas.

There is no widespread universal agreement, unity and harmony within this theoretical field (Phillips, 1995; Stahl, 1991). For instance, among constructivists one finds the developmental biological constructivist, Jean Piaget (1971), the "neo-Piagetians" (Robbie Case, 1985), the challengers to the Piagetians (Brainerd, 1978), the "Information-Constructivists" (Robert Stahl, 1989,1990, 1992b), and the "Radical Constructivists" (Ernst von Glasersfeld, 1988, 1989; Phillips, 1995). The positions held by the supporters of each of these constructivist perspectives share a set of core concepts and principles, but then vary considerably in many specific details. For instance, von Glasersfeld (1988, 1989) makes it quite clear that his unique view of constructivism requires one to reject certain conceptions of the origin and source of knowledge as well as to reject the notion of truth, reality, and validity as these are typically viewed by many cognitive scientists, including all 'nonradical' constructivists.

No single event marked the end of the reign of the Associationist and Behaviorist perspectives or the beginning of the cognitive perspective in American psychology (Bruning, Schraw & Ronning, 1995). Cognitive psychologists do not agree on the key events, publications, ideas or persons that brought into existence as well as fully established their perspective in its present position, even though they tend to cite some of the same ones in their longer "histories" of the field. In addition, those interested in the development of this field cannot always determine whether the ideas of later psychologists were directly or indirectly influenced by one or more earlier theorists or writers, or emerged independently of others.

A Set of Major Assumptions of Cognitive Psychologists

Depending upon one's perspective, the number of common elements across the different theories in the cognitive psychology field range from being many to very few. Even the perspectives proposed as alternatives to the more technical or individualistic theories or models quite often are explainable by, if not consistent with, the very theory they appear to challenge.

To date, the theories, conceptions and principles in this field are not as well-defined, strongly agreed upon, and widely accepted among proponents as were the ideas associated with the behavioral psychology of B. F. Skinner (1953). This "chaos of sorts" within cognitive psychology is in

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1 The labels "cognitive science" and "cognitive psychology," like "information processing theory," lead many to perceive that these inquirers and researchers are not at all interested in feelings, affect, and/or psychomotor abilities. This perception, while it holds for some, is not the case.

2 This assumption pertaining to symbols and information guides the work of researchers in computer science and artificial intelligence.

part a product of the very nature of its focus (i.e., the nature of what and how humans internally think, know and learn) and of the shortness of the period of time within which the study human cognition independently of behaviorism was an acceptable endeavor.[3],[4]

Cognitive psychologists tend to accept the following as central assumptions:

- learning is an active process in contrast with the internally-passive learner notion supported by the Behaviorist perspective (Gagne, 1985).
- mental processes, structures, events and states as well as the contents of cognition can be accurately inferred from observations of human behaviors and their products.
- the concepts and principles of cognitive psychology can be applied to guide teachers in assisting, if not maximizing, student learning in every academic area (Gagne, 1985).
- individuals are born without prior knowledge; they construct and acquire their *knowledge* after birth as a result of their interactions with their environment.
- individuals appear to be born with some cognitive or *epistemological* equipment or potentials, although what these are is in dispute among the different "camps" of constructivist theorists (Phillips, 1995).
- human *knowledge*, whether personal or associated with a field or discipline of study, is constructed internally within and by each human (Phillips, 1995).

A Brief Overview of Humankind's Interest in Human Mental Processes and Thought in the Western World

Contemporary cognitive psychology concerns the human mind, thought and memory as well as their inferred processes, structures and organizational arrangements as a means to explain human actions and their products. The notion of the existence of internal entities, such as a mind or thought, is not a recent phenomenon: the ancient Greek philosophers appear to the be first people in the Western world to consider the mind, thought and memory to be worthy of public discussion, analysis and of being taught to others.

The Greek Philosophers

In the 300s BC, Plato and Aristotle provided the first clear recorded statements on thought and memory as they presented and defended their notions on the nature and origins of "knowledge." Their perspectives were philosophical rather than scientific: therefore, they cannot be claimed to be cognitive psychologists in the scientific sense of the label.

The European Philosophers of the "Age of Reason" (i.e., mid-1600s - mid-1800s)

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3 See John Anderson (1990) for one overview of the history of this field. Also see Ellen Gagne (1985), John Flavell (1985), and Ormond (1990) for additional background on the emergence of cognitive scientific thought, models, and constructs.

4 For instance, in the late 1960s through to 1975, the ideas of Sidney Jourard, Carl Rogers, Arthur Combs, and George Kelly, all heavily embracing the notions of internal cognition and human sense-making, were labeled pseudo-psychology or philosophy by a number of behavioral and empirical psychologists encountered during the author's graduate work.

Sixteen hundred years later, many of the essential points raised by Plato and Aristotle were reiterated and expanded by such British philosophers as Locke, Hume and Mill, who supported the empiricist view, and such Continental philosophers as Descartes and Kant, who supported the nativist view (Anderson, 1990).

During this period, individuals from all parts of the Western World applied the emerging concepts and methods of science to study all areas of the natural and social worlds; hence the name "social sciences" came to include those disciplines where the principles and methods of science were applied to understanding and explaining past events (History), political activity (Political Science), and economic activity (Economics). However, in this rush to and insistence on applying the scientific perspective, there was no attempt to apply this perspective to the study of human thinking and mental activity; even though there were no conceptual, social, professional or technical barriers to prevent such an effort (Anderson, 1990). Yet, in spite of all the philosophical alternatives and assertions, what was known about cognition and mental processes up to the mid-1880s was essentially the same as the information shared by Plato and Socrates 2000 years earlier (Anderson, 1990).

The Emergence of a "Scientific Psychology" and of Scientific-Based Notions of Cognition

Given that cognitive psychology is concerned with describing hypothesized mental processes and events, the origin of cognitive psychology, as opposed to cognitive philosophy, was in 1879 with Wilhelm Wundt and his associate's empirical-scientific investigations of the workings of the mind (Anderson, 1990; Gagne, 1985). Wundt established the first psychology laboratory in Leipzig, Germany. These cognitive psychologists stressed the study, description and explanation of mental processes and their products -- as well as the ways these might affect one's thinking, perceptions and behaviors. Using as the primary method of inquiry, introspection (i.e., self-observation leading to self-reports), Wundt investigated consciousness and perceptions of and by the conscious mind. Eventually Wundt developed a theory of cognition that fit the self-observations of the subjects of his studies.

Over a decade later, Freud used the assumptions and techniques of introspection to investigate the conscious as well as the nonconscious mind. Using free association techniques and analyzing the contents of people's dreams, Freud constructed an elaborate structure of the mind - a mind that included the id, ego and superego.

From the early Wundt studies through the 1920s, the scientific-introspective approach dominated psychology in Europe. This approach was generally rejected by most Americans, although by 1920 the ideas of Freud and Jung had taken hold as a means of providing psycho-therapy to those who sought help from trained psychotherapists. In the three decades following the publication of Wundt's ideas and methodologies, American scientists and others interested in human learning and behavior did not take their psychology seriously enough to engage in extensive scientific investigations, choosing instead to rely on casual, reflective self-inspection rather than intense, analytical scientific investigations (Anderson, 1990). In 1890, William James, the best known of the American psychologists of the era, published Principles of Psychology and labeled psychology the "Science of Mental Life."

The American emphasis on pragmatism and functionalism demanded that American psychology be pragmatic and functional as well. Therefore, what could be more functional that to construct a theory that could explain ways to improve knowledge acquisition and learning in school settings. Given this emphasis, many of the early American psychologists either emerged from Schools of Education or were directly interested in forming theories of learning that were directly applicable to school settings (Anderson, 1990). Edward Thorndike (1911, 1913) was one of the leaders in this field, even though he conducted many of his experiments using and developed many of his theories, especially on human problem solving, based on nonhuman subjects, such as cats -- subjects that

could not introspect. Thorndike inferred that the same trial-and-error steps that his animals followed to solve problems were the same as those that humans used.[5]

The Associationist-Behaviorist Challenge to Both Scientific-Introspection and Reflective Self-Inspection

During the opening decade of the present century the prevailing philosophical ideas emerged from the natural sciences solidified the empiricist or positivist notions that eventually came to dominate psychological thinking for at least eight decades. In 1906, Karl Pearson published Grammar of Science which clearly articulated the positivist epistemology which rejected the notion of human-constructed meaning in favor of a view on what humans physically did in the form of behaviors. At this same time, other scientists of the empiricist bent rejected the entire mental processes approach to the study of human behavior, claiming that efforts to explain human behavior in terms non-observable, yet assumed mental processes and mental structures were dysfunctional and that psychology needed to be the science of observable behavior.

John B Watson (1914, 1930) was the leading proponent in what became the Behaviorist school of psychology. He argued that we could not directly observe internal, mental events and that introspection could not generate data that could be independently verified via any accepted scientific methodology (Gagne, 1985). For Watson and his followers, direct observation and independent verification of claims were required for all scientific theories and principles of human psychology. Approaches or theories that lack either were not considered scientifically sound or viable, even "medieval" (Watson, 1930; p. 2). The behaviorists seemed so fearful of buying into and using subjective fallacies that they "refused to let themselves think about [any and all unobservable] mental processes (Anderson, 1990: 9).

By 1920, Watson's intense attack on all theories that were based on introspection as well as those that posited mental operations or processes discredited nearly all nonBehavorist theories of learning and behavior. For him, any belief in the existence of a mind and of consciousness was equivalent to the ancient world's beliefs in superstition and magic. Consequently, concepts of the mind, consciousness and mental operations had no place in modern scientifically-based explanations of human behavior. Watson (1930) claimed that such cognitive concepts as perception, desire, purpose, thinking and emotion, if defined in subjective terms or from a subjective perspective, were to be excluded from all scientifically-sound vocabulary of human behavior.

More importantly from their perspective, the Associationists believed that there existed universal laws of learning and that what principles of learning that were discovered in working with animals could be extrapolated to human learning. The stimulus-response association was the core of their ideas, and all constructs, principles and applications ultimately had to be aligned directly to this association.[6]

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5 Two decades later, Wolfgang Kohler (1929), a leader in the Gestalt School that resisted the strict environmental Behaviorist perspective of Watson, reported research on chimps that seriously eroded Thorndike's notions of trial-and-error learning for both humans and non-human animals. However, some of the notions of the Gestaltists, such as their concepts of insight, problem solving and problem, are not accepted by most psychologists today even though these notions are strongly "cognitive" in nature. The Gestalt perspective, which originated about 1910 and continued through the mid-1930s with Max Wertheimer, Wolfgang Kohler and Kurt Koffka as its major researchers-writers, sought to discover the principles or laws that direct human perceptions, i.e., how people assign meaning and make sense of visual stimuli.

6 Other associationists followed up on the work of Hermann Ebbinghaus, who in 1885, studied the storage and remembering of mostly "nonsense syllables" in what is typically labeled rote or nonmeaningful learning. These associationists eventually constructed different formats of stimulus materials and complementary research methods such as serial list learning and paired-

Watson's empiricist notions of universal laws of learning and appropriate scientific methods of studying behavior as well the principles of learning discovered to data about explaining human behavior were supported in the 1920s by the findings of Pavlov, in the USSR, and in the 1930s by B. F. Skinner, especially as outlined in his classic book, The Behavior of Organisms (1938). Building upon the empirical-behaviorist conception, Skinner, who became the major spokesperson for the "radical behaviorists," adhered strongly to Watson's notion that environment played a very large and strong part in determining any organism's behavior. Skinner (1938) asserted that "behavior is what an organism is *doing* - or more accurately what it is observed by another organism to be doing" (p. 6). For Skinner, the purpose of psychology was not to describe consciousness or any assumed, unobservable phenomenon such as a mind, internal knowledge or thought, but was to explain, predict and control behavior. Organisms behaved within and because of their environments. More specifically, what how organisms act (i.e., behave) is a function of and a direct consequence of the environment in which they were a part at the time of their behavior and their respective learning histories preserved as associations between prior stimuli and the particular organism's responses to these stimuli.

Interestingly, in the same year as Skinner's The Behavior of Organisms: An Experimental Analysis, Reed's Presidential address to the American Psychological Association advocated far greater emphasis be made on the mental constructivist tendencies and personal meaning-making of humans. For many reasons, those who were already caught up in the demand for a real "science of behavior" failed to follow his recommendation. The reasons why those not already in the empiricist-behaviorist perspective either did not follow his recommendations or follow them strongly enough to seriously challenge the behaviorists have not been reported.

By the late 1950s and into the mid-1960s, Behaviorist principles and concepts were gaining greater acceptance in behavioral therapy situations, classroom management, programmed learning, teaching machines, and reinforcing learners. One problem many had with Behaviorism is that to implement the principles of instruction that complemented its principles of learning, teachers had to master a very technical vocabulary and very technical steps for organizing the content to be learned, for monitoring the learning situation and the learners' activities, and for providing feedback to students.

At about the time of Behaviorism's greatest successes in the public arena and educational settings, the public and educators were finding a number of alternative, typically less technical, perspectives more compatible with their interests and goals.

The Reemergence of a Strong Perspective of Cognitive Constructs and Processes

During World War II, some psychologist were engaged by the military to conduct research leading to the selection and training of personnel. As they studied the complex tasks that many of the men had to master and then complete, such as flying an airplane, they questioned whether the principles of behaviorism could sufficiently explain the learning of and completing such tasks.

After the war, these researchers continued to seek an alternative view to Behaviorism and one that could explain the assumed processes involved in learning the myriad of abilities associated with completing complex tasks (Gagne, 1985). In a sense, their efforts were aimed at describing what occurs within the "black box" between input and output without ever having direct access to its inner workings, parts or sequences. In On Understanding Science, James Conant (1947) asserted that scientists actually construct "conceptual schemes" that guide their inquiry and that their inquiries either support or eventually lead them to modify or reject their schemes.

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associate learning. Again the emphasis was on discovering universally applicable principles of human learning.

Concurrently, ideas and perspectives compatible with the cognitive view were emerging in related and, at the time, unrelated fields. In 1948, N. Weiner published his book, Cybernetics. At about the same time, Information Science produced a number of new concepts, including a formal definition of a "bit" of information (e.g., see Shannon, 1962, in Gagne, 1985).

According to Anderson (1990), the 1950s was the decade when the "true pioneers" broke with Behaviorism to establish the foundations for the cognitive psychology we have today. Anderson (1990) asserts that there were three main influences that became stronger as the decade continued and that account for much of the reemergence of a cognitive conception of learning and behaving. The first of these was the set of ideas associated with the *information processing approach* and its complementary *information theory*. Anderson credits Donald Broadbent as being the most influential of the early scientist in integrating ideas from information theory with information processing activities and mechanisms. The ideas advanced by those in the field of artificial intelligence, especially those proposed by Allen Newell and Herbert Simon, became the second influence. The third influence came in the area of psycholinguistics. Noam Chomsky's proposals about the structure of language and the likely features of language development and acquisition not only were consistent with the field of cognitive psychology during 1959, he directly challenged and seriously undermined Skinner's behavioristic explanation of language acquisition and use, claiming that cognitive variables were crucial variables in explaining language acquisition, use and development.

Other ideas and events during the 1950s also contributed to the shift away from Behaviorism. For example, in 1956, George Miller published his paper on the "Seven plus or minus two" chunking-characteristic of a hypothesized Short Term Memory. In 1956, Bruner, Goodnow and Austin provided an explanation of human behaviors that was in sharp contrast to the prevailing behavioristic principles. Their approach spoke again of cognitive processes, states and abilities that involved as well as gave rise to human behavior. The extent to which the USSR's launching of Sputnik in October 1957 contributed to advancing interest and research into cognitive processes and development will never be known. However, shortly after this launch, at all levels of education funds were available to find out ways to maximize students' conceptual thinking and higher order learning -- areas that were of no concern to Behaviorists.

Like in the early 1900s, the demands of society during the early 1960s for greater academic achievement in schools resulted in utilitarian motives and focuses of psychologists. The nation needed views of learning that were immediately practical in maximizing learning within school settings. To make sure this occurred, materials and instructional strategies needed to be developed and tested to determine those that would be most compatible with helping students attain the success desired or expected. The "new math," "new science" and "new social studies" proposed during this period were based upon cognitivist rather than behaviorist notions of learning and instruction.

By the early 1960s, the growth of computers and the technology associated with their ability to process information led some psychologists to view mental processes as analogous to the computer as an information processor. As a consequence, many people came to use terms such as Short Term Memory and Long Term Memory in speaking of components of human cognition, even to looking for one-to-one matches between the human and computer information processing systems.

In 1960, George Miller and Jerome Bruner founded the Center for Cognitive Studies at Harvard. Shortly afterwards, Robert M. Gagne (1962) and David Ausubel (1960, 1963, 1968) presented alternative cognitive theories were viewed as being useful for guiding teachers toward increasing students' learning at all levels. David Ausubel's The Psychology of Meaningful Verbal Learning (1963) and Educational Psychology: A Cognitive Approach (1968) provided the first comprehensive theory of learning that emphasized the role of personal meaning and meaningful learning. In extensive detail he described the roles of concepts and propositional thinking and learning and the direct connection between prior knowledge and "meaningful" learning. He distinguished "meaningful" (i.e., non-arbitrary, non-verbatim, and substantive) learning from "rote" (i.e., arbitrary, verbatim, and

non-substantive) learning. For Ausubel, meaningful learning required (a) meaningful learning tasks, (b) relevant prior knowledge possessed by the learner, and (c) meaningful learning set. Without these requirements being met, students are limited to rote learning in most tasks they complete in schools. Furthermore, he claimed, for most students most of the time, all three of these are partially or wholly absent from their instructional environment.

Ausubel (1968) proposed a *theory of subsumption* that described how a schema operates in comprehending meaningful material. According to this theory, adults store a number of hierarchically-arranged concept trees in memory. Incoming information is compared with these trees in a pattern recognition fashion. When the incoming information matches any of the concepts, the new information is subsumed under that particular concept tree. When it does not match exactly, some modification either to the new information or the concept tree may occur so that the new information may be subsumed under an existing cognitive structure. When modification is not possible, then a new concept tree must be created if the information is to be stored. He claimed that the majority of adults possess enough concept trees and that most of the new information they encounter is subsumed under existing cognitive structures or schemes.

By the early 1960s, a small number of American educators and many educational psychologists bought into the ideas of Jean Piaget, the Swiss biologist-turned psychologist, concerning inferred stages of human cognitive development.[7] As a result of his work on finding how children's cognitive knowledge and explanations were formed and then changed over time, Piaget asserted that knowledge was what each child constructed as he or she internally invented the world in which he or she lived as he or she viewed and interacted with it.[8] Unfortunately, Piaget never produced a theory of learning, even though many individuals, even today, treat his theory of cognitive development as a learning theory.

A generally accepted significant event on behalf of gaining attention for the cognitive view was the 1962 publication of Thomas Kuhn's The Structure of Scientific Revolutions. Building upon Conant's concept of schemes, Kuhn asserted that scientists construct "paradigms" that become their conceptual frameworks and "goggles" thereby determining what they attend to, assign meaning to, and do during their inquiries. These paradigms shape the results of their inquiry as well as the problems they frame and attempt to solve. Furthermore, these paradigms shape the interpretations, conclusions, and explanations they generate from what they see, find, and do. For Kuhn, "normal science" was conducted using the conventional paradigm of the times, while "revolutionary science" occurred when a new explanatory paradigm was advanced and then used. Kuhn introduced the notion of "paradigm shifts," or the overthrown and then replacement of a conventional framework by a "revolutionary" alternative.[9] Kuhn's work, directed at the scientific community broadly defined, dwelt

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7 Although Piaget had been publishing his ideas from the mid-1920s, his works were either not noticed by or were largely ignored by English-speaking psychologists and educators until the early- to mid-1950s.

8 While Piagetian developmental psychology seemed at first to have a great deal of promise in helping learners learn and teachers teach and is fascinating in observational laboratory situations, it has little relevance to the classroom (e.g., Helm & Novak, 1983), although Shayer and Adey (1981) disagree strongly with this claim. In any case, the early 1980s saw a marked movement away from Piaget's developmental notions, especially those relative to stages, and more toward other versions of cognitive constructivist psychology (Novak, 1984).

9 A decade later Toulmin (1972) proposed that a paradigm "shift" is more evolutionary than the either-or conception offered by Kuhn in his first book. For Toulmin, what occurs is that a number of competing ideas are proposed to challenge the prevailing notions and frameworks, some eventually merging, being modified, becoming gradually extinct, or rejected over time. Thus, the original models and explanations are continuously being challenged, revised, and refined until a more viable set of concepts and explanations emerge -- with these too also undergoing the same

on the importance of constructed paradigms or perspectives and the power of these to influence thinking, inquiry and conclusions within any community. Scientists all over the world and in every discipline began talking about constructs and the psychology behind their formation, use and revision. Psychologists and educators also took note of Kuhn's concepts, particularly those interested in the constructivist perspective of thinking and acting.[10]

What emerged by the late-1960s was the notion that concepts, models and principles could be formulated that would allow for the analysis and explanation of mental processes and events and their products (e.g., "Knowledge") as well as human behaviors linked to these processes and events. Uric Neisser's book, Cognitive Psychology, in 1967 was a landmark event during this decade, being the first book by a well-known psychologist with "cognitive psychology" in the title. Within the new psychology -- as opposed to philosophy -- of the mind were new concepts, such as "schema," "propositional networks," "logits" and "cognitive maps" to describe mental representations and new labels, such as "schema restructuring," "inheritance of generalizations," "composition" and "spread of activation" to label assumed mental processes (Gagne, 1985). However, as in every discipline, it is not always clear whether each of the labels and terms then or now refer to separate concepts, structures, processes and so forth or are different names for the identical concepts, structures, etc. (Gagne, 1985). One drawback to this new psychology was that many of the concepts, structures and principles were still linked to philosophical concepts and conceptions - a drawback that continues to today.

In 1970, the journal, Cognitive Psychology, was published. This journal not only helped to legitimizes cognitive psychology, but helped to further define the field and distinguish it from alternative perspectives of human activity. Six years later, another journal, Cognitive Science, began publication. While much overlap exists between "cognitive psychology" and "cognitive science," the main distinction between the two appears to be cognitive science's emphasis on using computer simulations and representations of internal human activities as opposed to the experimental, quasi-experimental and ethnographic studies approach used by cognitive psychologists.

By the early 1970s, some cognitive psychologists were rejecting the computer metaphor as inadequate and misleading for the human information processing system (e.g., Paivio, 1972). At the end of that decade, Stahl (1979) had constructed a drastically different model of the human information processing system within the context of the constructivist paradigm.

During the 1970s, the label "Constructivism" gradually emerged to become the term most educators use to refer to the general field of cognitive psychology and the perspectives that were associated with it. However, this is not to say that there is a one-to-one match between the major principles and concepts that all cognitive psychologists and constructivists accept. Consequently, educators are urged not to equate cognitive psychology with constructivism as well as not to view all constructivist perspectives as having a great deal of overlap among themselves.

This learning theory is a departure from the dominance of behavioral psychology and concerns internal cognitive functioning that emphasizes the role that human-invented conceptions, meanings, and decisions play in learning and behaving. The word *constructivism*, derived from *construct*, is used because advocates of this perspective claim that individuals spend their lives constructing or inventing their own meanings, ideas, views and conceptions of the actual and of imagined worlds,

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evolutionary processing by scholars and new findings. The second edition of Kuhn's book reflected "evolutionary" rather than "evolutionary" transitions between paradigms.

10 Contemporary science educators who are "constructivists" point to Kuhn's 1962 book as a landmark event in support of the constructivist perspective within the scientific community, among philosophers of science, and among science educators. Among constructivists within the scientific community, Toulmin's 1972 challenge to Kuhn and Kuhn's second edition are equally important events to Kuhn's first book.

and interpretations of the phenomena they encounter. All individuals are said to construct personal versions and knowledge of *reality* as a by-product of their life experiences which are themselves constructed by each person and which are retained and remembered in the ways each person chooses.

For most constructivists, constructivist theory is still primarily an epistemological theory in that it emphasizes the nature of knowledge, of knowing, and of knowledge generation and construction. Many constructivists reject the empiricist and positivist views that centered on conducting experiments to "prove" or "falsify" hypotheses that would establish and verify "truths" and "natural laws" that have traditionally been accepted as existing independent of humans. For many of the constructivist bent, inquiry, even scientific inquiry, is not "truth seeking" but the activity associated with constructing viable explanatory models and notions that are functional for specific or general purposes.

The newness, importance, implications and usefulness of the field of cognitive psychology have been recognized by social studies educators (Torney-Purta, 1991; Brandhorst, 1989; Stahl, 1980, 1987c, 1988a, 1990, 1995). Educators such as these agree that while there are many technical aspects in the different theories and versions in cognitive psychology and that differences exist concerning specifics and emphasis, there are a number of conceptions and principles that the majority of cognitive scientists accept.[11] These widely held conceptions and principles are powerful information tools that, when correctly used by social studies educators,[12] can enhance learning and increase student success in attaining valued social studies goals.

Social studies educators should note that the "social studies" as a worthwhile segment of curriculum and school study is an invented concept and field (Barr, Barth, & Shermis, 1977; NCSS, 1994; Stahl, 1991) as are all psychologically- and socially-determined constructs. As an invented construct, all the components associated with social studies, including its definitions, goals, purposes, and content, are subject to refinement, revision, replacement, and different emphasis. (Also see for example, Lysbarger, 1980; Nelson, 1980; and Robinson, 1980).

Cognitive psychology conceptions and assumptions that are useful for social studies educators

The central assumption of cognitive psychology is that each individual is an active, relentless, and continuous inventor, sense maker, meaning maker and constructor of an idiosyncratic representation and version of the world and self as he or she perceives the world and self to be. This assumption complements many others, some of which are addressed below with brief expansions or connections to instructional settings. One could say that the typical cognitive psychologist:

a) assumes that nothing has inherent meaning, consequently any and all meanings that a thing has are assigned by each individual. Therefore, for something to be meaningful in appropriate ways, each individual must spend the time needed to engage in the processing needed to make sense of and assign meaning to it. In classroom settings, teachers would accept that each student must have appropriate opportunities to study, consider, and reflect upon each piece of information, event, or artifact encountered in order to assign appropriate meaning(s) to each. Meaning cannot be passed on to or absorbed by the student, regardless of how meaningful it is to the teacher, course, or subject area being studied.

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11 Donald Norman (1980), a strong, early proponent of the cognitive psychology perspective, articulated a number of concerns that he had about this perspective and what it had and had not "achieved" or "answered" as of the date of his publication. Some of these have been addressed rather well in the decade since his article.

12 This group includes social studies teacher educators and staff developers.

b) assumes that while meaning is vital for something to be learned, this *making sense of* and *assigning meaning to* a thing does not guarantee that what data were encountered or what is being thought about and assigned meaning will be learned.

c) assumes meaning is determined by each individual in light of activated existing knowledge and context as the individual perceives this context to be at that moment. While meaning is linked strongly to context (Cohen, 1983; Mishler, 1979), the educator must remember that the context itself is interpreted and construed by each individual as she or he perceives this context to be at that moment. Hence, the learner's perceived context in any particular situation may be very different from the actual or intended context or context as perceived by others.

d) assumes that each individual constructs his/her own knowledge and knowledge structures. In other words, the knowledge that makes a difference for each individual does not exist in outside resources, people or things, but exists in the brain in the form of personally organized, meaningful, prioritized and constructed "knowledge structures," conceptions, notions and data each person has concerning the world and self. In classroom settings, for example, teachers do not provide knowledge through their lectures or from the text. Rather, the teacher brings students to encounter data in various forms and whatever students construct and organize during this encounter and about these data and then retain represents their "knowledge" which, in turn, becomes their "prior knowledge" to bring to future situations.

e) assumes that the "knowledge," meanings and versions one has at a particular moment may, for any number of reasons, change over time (Anderson, 1990; LeSourd, 1988; Piaget, 1971) as well as the moment of recollection (Bartlett, 1932; Loftus, 1979).

f) assumes that there are multiple memories, although what these memories are and what they each do is open to an extremely wide range of interpretations (Schacter, 1987; Stahl, 1982, 1992b; Voss, 1979).

g) assumes that cognition (or, internal brain-intellectual events, states, contents, functions, and products) usually involve physiological events, emotions, muscle-motor movements and actions, self conceptions, and social and cultural interactions perceived meaningful and functional by the individual. Cognition is viewed as an integral, highly interrelated part of human biological existence and part of the human condition at any particular moment. Therefore, affect, including emotions, are a constant, integral part of cognition, even though, for analytical and descriptive purposes, affective states and events may be treated as though they were separate from cognition.

h) assumes that each person may modify as well as augment "prior knowledge" in light of the meanings assigned in the present, including meanings generated as a result of reflecting upon re-presentations of prior interpretations and conceptions and earlier-encountered data.

i) assumes that the "knowledge" one invents, organizes, stores, and uses may be adequate, correct, appropriate, and complete as well as inadequate, incorrect, inappropriate, or incomplete. This assumption, which has become quite solidly documented, especially in the various subfields of math and science, has tremendous implications for social studies educators. One consequence of this assumption is that teachers must provide students appropriate opportunities and sufficient time to facilitate their students' construction of adequate, acceptable and complete meanings and "knowledge" to support what they study in each period, in each resource, and during each task. If these are not arranged, then the chances that students will assign and construct inadequate or incorrect meanings

and conceptions increase significantly, especially when any student's prior knowledge is less correct, adequate or complete than what is required as an appropriate entering level of prior knowledge (Bloom, 1976; Stahl, 1992b).

j) assumes that cognitive activity, development and growth are linked to inherited potentials and to biological-physiological states, conditions and processes that occur almost exclusively in the brain (Hart, 1983).

k) assumes that what the individual brings to any situation in the form of "prior knowledge" and expectations has a substantial, continuous and sometimes pervasive influence on his or her perceptions, meaning making, constructions, feelings, actions, learning and forgetting.

l) assumes that what constitutes prior knowledge is related to mental structures. These structures are typically called *schemata* (Rumelhart, 1981; Torney-Purta, 1991), although Stahl (1991, 1992b) prefers *infoschemata*.[13]

The above provides a second set of representative major assumptions that cognitive scientists appear to share. In the section below, details of a particular sub-perspective within this field are provided. This view, labeled the "Information-Constructivist perspective," accepts many of the assumptions just listed. Before the IC view is stated, an overview of contemporary "constructivism" and its background are provided.

Constructivism: A Sub-Perspective Within Cognitive Psychology

A Number of Constructivist Views Exist

There is no one extensive, all-encompassing constructivist perspective that all adherents to constructivism accept. Constructivism is not a monolithic perspective containing a single extensive set of ideas, principles and concepts that all proponents accept, and these proponents do not exist within a very tightly-knit academic community (Stahl, 1991; Phillips, 1995). Rather this theoretical perspective is an evolving set of ideas within which widely different viewpoints have emerged. Given the concepts and principles of its various theorists and advocates, a single homogeneous constructivist theory is neither likely nor possible.

Details the broadly-based constructivist orientation is provided as a context to detail the ideas, conceptions, principles and models associated with the Information-Constructivist (IC) perspective, a viewpoint that departs significantly from other constructivist models on a variety of issues and conceptions. Selected aspects of the IC perspective are stated as is a sample of applications and implications of the IC perspective for social studies education.

Context for Modern-Day Constructivism and The IC Perspective

Constructivism is a theory of an active "inventor" and active "learner," although most adherents would prefer the labels active "knower" and active "knowing". Many constructivists reject the notion that *knowledge* is something that exists independent of the knower and is an external commodity that learners can have some of, much of, or none of about certain things, but never all of. For these constructivists, "Knowledge" is not an embodiment of "Truth" that is found naturally in and that reflects an objective world that exists independently of the knower. In this sense and for these constructivists, there is not and there has never been an independent set and source of Knowledge

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[13] The concept of *schema* as typically defined in contemporary cognitive science is very different from the original definition of *scheme* proposed by Piaget, but is similar to that of Bartlett (1932). Also see John Flavell's (1986) discussion of this concept.

external to each person: there can only be personally-invented knowledge that is invented by and exists inside each person.

This section provides a short overview of earlier contributors to constructivist thinking.

Giambattista Vico: The first modern era constructivist? The origin of modern constructivism has been traced back to the 1710 publication of Giambattista Vico's treatise.[14] In it, Vico argued that the human mind can "know" only what the human mind has made; that is, knowledge is what each person has personally and internally invents and puts in it.[15] The ideas this treatise contained represented a serious challenge to traditional Western epistemology and to the philosophies of knowledge of his era, for to accept Vico's position meant one had to reject the then-existing theological and idealist/realist philosophical paradigms as to what "knowledge" was/is and what the ultimate source of knowledge was/is. One contemporary reviewer of Vico remarked that before his ideas could be accepted, Vico had to prove that what he asserted was *true*. This demand for proof displayed the reviewer's failure to adequately comprehend Vico's ideas because, for Vico, there was no way to prove or disprove any idea as being true or to prove as true what one invents as knowledge of or about any thing. To demand a proof of truth called upon Vico to evoke a principle of empirical thought (i.e., the notion of "truth") that he seems to have rejected.

However, we must be careful not to over credit Vico as a constructivist, such as labeling him the "Father of Modern Constructivism." While Vico's statements may have a strong hint of modern constructivist thinking - although the matter of whether he was a constructivist at all is not entirely settled (e.g., 19); because no contemporary constructivist developed his or her ideas from his works or depended upon his ideas, we cannot claim Vico's ideas served as actual seminal ideas for the contemporary constructivist perspective (e.g., Haddock, 1976; Mora, 1976). In other words, we must not attribute to him ideas that gave rise to or were important in the formation of modern-day constructivist theory. Further support for this caution is that he was virtually unknown to the scholarly world for over two centuries and no one bought into, much less publicly-advocated the acceptance of, his particular ideas for nearly 250 years after his treatise was published. Unfortunately some modern writers claim he made substantial contributions to Marxist ideology, positivism, realism, idealism and existentialism even though he is not cited by a single primary author of any of these perspectives.

Post-Vico contributors to the constructivist perspective prior to the present century. Key individuals in the two centuries that followed Vico who generated convincing arguments counter to the prevailing realist/positivist position are worthy of mention.

John Locke rejected the notion that the sensory (secondary) properties or features of external things were the source of "true" information about the real world. Berkeley argued that the primary properties, such as motion, number, spatial extensions and other properties of external things were not the source of "true" knowledge.

Hume claimed that causality and other categories and relationships that are used to organize experiences and to describe connections between entities in the physical world were determined by the conceptual framework of the human knower.

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14 The comments in reference to Vico's treatise, including reactions to and interpretations of it in the context of the 1700s, are from Haddock (1976), Mora (1976), von Glasersfeld (1988), and Gariano (undated).

15 Many constructivists prefer the label "invent" over "construct," in part because of the way which the terms "construct" and "construction" are commonly used. They claim the former is much more consistent with what actually seems to be the case in human cognition. As used here "to construct" includes both the inventing tasks and the internal building, organizing and placement tasks associated with the construction processes.

Later, Kant argued that space and time, heretofore considered absolute features of the universe and an independent reality and basis for truth, were human constructs and necessarily products of human experience. Kant made it clear that humans cannot even imagine the structure of the real, independent external world because whatever is referred to as "structure" is necessarily a humanly-invented arrangement of space, time, or both (in von Glasersfeld, 1989b).

The above philosophers and their supporters have also been called the founders of modern constructivism because their ideas of acquiring knowledge, of knowing, and of the nature of knowledge are compatible with many ideas in contemporary constructivist theory. However, the extent of their contributions to the actual foundation of one or more contemporary constructivist perspectives is not possible to verify because contemporary constructivism emerged from as well as was part of the "Cognitive Revolution" that started in the 1960s and this revolution was based on psychological -- not philosophical -- interpretations of data on human thinking and learning. For instance, we do not see in the works of Bruner (1963), Neisser (1967) or Ausubel (1963) references to the "constructivist" philosophers of the 1600s, 1700s and 1800s, although there are occasional references to William James (1890) who advocated some notions that have a modern-day constructivist bent.

Jean Piaget: An early Twentieth Century constructivist theorist in biological-psychology and epistemology In the 1920s, Jean Piaget began generating what was to become the first comprehensive cognitive-constructivist theory as a different way of viewing knowledge and the world of the knower and knowing (e.g., Piaget, 1952, 1970, 1977). Building upon Kant, Piaget generated his view of cognition and knowledge as a biologist, conceptualizing intelligence and knowledge as biological functions whose development and use had to be (and could be) described and explained within the ontology of organisms (von Glasersfeld, 1989b). His perspective was largely psychological rather than philosophical in that it stressed what occurred and could occur within the learner as a developing, active cognitive being, learner, and "knower."

Social scientists formulate new perspectives for their respective disciplines. In the 1920s and 1930s, a number of individuals in the social and behavioral sciences increasingly advocated conceptual frameworks relative to their disciplines that were identical to those now associated with the constructivist perspective. Charles Beard (1935) and James Becker (1926), for instance, claimed that "history" was not the past and did not exist in the past. Rather, for them "history" exists in the present within each individual as he or she actively interacts with, interprets, and assigns personal meaning to data about past occurrences from his or her own current perspectives, value system and biases (also Croce, 1941). For them, because "history" is what each person invents about what occurred in the past, studying and learning history is not retaining what is in a textbook or lecture but generating through active interaction with data sound interpretations and reconstructions of past occurrences. The quality of each individual's invented history was dependent upon the use of certain procedures and standards which themselves were constructs and tools invented within the particular discipline.

The constructivist ideas of the philosophers and those of later psychologists, social psychologists and theorists, such as John Dewey (19), Bartlett (1932), George Herbert Mead (1934), George Kelley (1955), Carl Rogers (1945), Uric Neisser (1967, 1976), and Merlin Wittrock (1978, 1986), collectively provide a present-day basis for constructing a viable view of the human as an active assignor of meaning to his or her world, experiences, and self.[16] Many theorists made their contributions to

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16 As Haddock (1976) cautions, one must be weary of claiming someone to be a "constructivist" or having directly contributed to constructivist thinking as though the person were conscious of that perspective prior to and at the time of his or her writing. For instance, while Piaget was certainly a "constructivist," one would be hard pressed to say when he actually came to invent the seminal ideas that came to be the defining parameters of a psychological as opposed to a philosophical constructivist theory. In another case, is it doubtful that Vico himself actually set about

constructivist thinking independently of the ideas of Piaget or of each other. Even today, some of these individuals are not considered in many psychological communities as being constructivists or to have made special contributions to the constructivist view, especially to constructivist notions being advocated for use in educational settings or among psychologists.

The Radical-Constructivist (RC) perspective. Ernst von Glasersfeld (1974, 1988, 1989a,b[17]), the leading proponent of the Radical-Constructivist (RC) perspective, took the ideas of Piaget and merged them with others to form a coherent *theory of knowing* rather than a *theory of knowledge*, even though at least one proponent suggests that RCism actually is a *post-epistemological* perspective (von Glasersfeld, 1989b[18,19]). An important reason why his particular view is "radical" is that it rejects totally and unashamedly the traditional notion of "Truth" as it is conventionally defined and, with it, the possibility of providing proof in the traditional sense of something being "true." The RC insists that a radically different set of assumptions be accepted that redefines, discards, or rejects nearly every assumption and principle of knowledge and knowing consistent with traditional views associated with determinism, positivism, etc.

To date, the basic principles of Radical Constructivism are:

a. knowledge is not passively received through the senses or directly transferred from external sources by way of communication.

b. knowledge is actively built up within and by the cognizing learner.

c. the function of cognition is adaptive, in the evolutionary biology sense of the term, tending toward fit or viability.

d. cognition serves the learner's organization of the experiential world: its purpose is not to discover an objective ontological world or reality (von Glasersfeld, 1988a, 1989b).

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attempting to invent a "constructivist" paradigm as a set of highly interrelated notions that was more psychological than philosophical. This is why even though we may claim to be able to "trace the origins of what has become the constructivist perspective back to" Vico, the lack of clarity and completeness of his ideas and failure of anyone to pay attention to him for centuries after his publication serve to weaken the case for his role in modern cognitive psychology and constructivist thought. Consequently, it would be an error to refer to him as the "father of modern constructivism." Indeed, whether Vico was even enough of a constructivist to label him a "constructivist" is still uncertain (Haddock, 1976; Mora, 1976).

17 Those searching for references to Ernst von Glasersfeld's work as well as others scholars whose name contain "von" should be alerted that sources vary in how they list these authors. For instance, works of Ernst von Glasersfeld are found under both "von Glasersfeld, Ernst" and "Glasersfeld, Ernst von."

18 von Glasersfeld (1989b) claimed that he would hold to the ideas of "Radical Constructivist" even if the assumptions and principles within this perspective had not emerged from or could not be traced to Piaget. In other words, Piaget contributed to Radical Constructivism as it currently is described only to the extent that RCs have borrowed and adapted Piaget's ideas and integrated them within their evolving conceptions of cognition and cognitive development. We do not know what Piaget himself thought about this unique version of constructivist thinking.

19 The Radical Constructivist approach of von Glasersfeld cited here should not be confused with the Radical Constructivist perspective advocated by Rachel Melkman (1988). The overlap of and differences between these two "radical" perspectives are not explored here.

The invention of the Information-Constructivist (IC) perspective. Bob Stahl did not start out to invent an alternative perspective, now labeled the IC view. His version of the constructivist perspective was an outgrowth of his work in the classroom with secondary school students, with undergraduate and graduate students in teacher education programs, and in staff development settings. The impetus to pursue this viewpoint came from his (a) concerns as to why pre- and in-service teachers had problems with comprehending and using Bloom's cognitive domain taxonomy (Bloom et al., 1956) as a model of cognitive outcomes; (b) involvement in developing practical tools to describe, guide and monitor verbal interaction in the classroom (Casteel & Stahl, 1973); and (c) interactions with students at all levels about what seemed to help as well as hinder their success in the classroom. In addition, he was curious about a number of apparent inconsistencies and shortcomings of research findings on human learning and existing models and conceptions of cognition and learning as they might be applied to classroom settings. Available views and constructs concerning human invention of knowledge and conceptions did not account for many things learners seemed to do, to not do, and to be capable of doing under varying instructional conditions. A perspective that allowed for the human elements of invention, construal, and personal sense making and that accounted for more of what seemed to occur in all humans across nearly every instance seemed warranted.

In generating a viable model of thinking and learning, Stahl merged the notions of such social psychologists as Bandura (1968), Mead (1934) and Kelly (1955); such cognitive psychologists as Ausubel (1968), Neisser (1967, 1976) and Wittrock (1978, 1986); such phenomenologists as Combs (Combs & Snygg, 1959; Combs, Richards, & Richards, 1976), Jourard (196) and Rogers (1945); and scholars in the various social and behavioral sciences and the Humanities such as Beard (1955), Becker (1926), Carr (1961), Croce (1941), Murphey (1982) and McGhee (198).

From Fall 1975 on, Stahl sought the common denominators of thinking and learning independent of any single theoretical or philosophical perspective. The focus of this search were the factors that appeared to be needed to enable individuals to think in appropriate ways and to maximize their learning as well as internal activities that could or may enhance or hinder such thinking and learning. Perhaps the most important focus was to discover or invent ways of explaining human thinking and learning that could be used by educators on all levels to improve learning. The rejection of a single theoretical or philosophical perspective as a guide to his search and interpretation activities and a concern to isolate the common denominators were keys to the perspective that emerged.

By 1980, the essential assumptions of constructivism were merged with theories and reported results of research findings on human thinking and learning and the components of the hypothesized human information processing system. The result was a synthesized theoretical perspective that generated a number of models relative to human cognition[20] (Stahl, 1980, 1987a, 1989a, 1992b). This approach was labeled the Information-Constructivist (IC) perspective in recognition of crucial roles information play in all cognitive activity and structures and to distinguish this extremely strong information-oriented perspective from other constructivist views and theories.

For Stahl, while much was being said about processing, about assigning and constructing meaning, and about the kinds of "knowledge" and processes learners could acquire; information, the essential and critical element of all cognition, affect and psychomotor actions, was virtually ignored. In school settings, information was being equated with "knowledge," which in turn was being viewed primarily as recalling information (Bloom et al., 1956). The notions that declarative, procedural, episodic, iconic and domain-specific "knowledge" exist independently outside the learner and that

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20 Two of these models are SPINPROM (Synthesis Perceptual Information Processing and Operations Model) and TIPIOA (Taxonomy of Information Processing Indicators and Outcome Abilities), an alternative to Bloom's cognitive taxonomy (Stahl, 1992b). Details concerning these models are available from the author. A third model, the IC Model of School Learning, is described briefly in this paper (also, Stahl, 1992a, 1994, 1995).

each of these information bases as "knowledge" could eventually be placed within separate declarative, procedural or episodic "memories" were rejected as dysfunctional.

For the IC, what exists outside learners are objects, phenomena and information; and information can be represented and used as declarative, procedural, etc. infobits.[21] However, objects and phenomena can only be represented in and considered within the learner in the form of information. Consequently, the learner either has or does not have appropriate information about particular objects, phenomena, etc. and either can or cannot use this information when, where and in the manner needed. Each learner, and each learner alone, has to make sense of, assign meaning to and organize in personally-meaningful ways every bit of information in these different classes of information. Only after these meaning-giving activities are completed within the learner can one even begin to refer to these self-constructed sets of information as "knowledge" -- that is, if one insists upon using this label to refer to psychological productions. Eventually Stahl rejected the concepts associated with philosophical "knowledge," "truth" and "reality" as these interfered with rather than enhanced the efforts to generate a purely psychological description and explanation of thinking and learning.

Given this short introduction, details within the IC view of cognition and learning follow.

Overview and Selected Components of the Information-Constructivist (IC) Perspective

The IC is concerned with constructivist notions within a psychological rather than philosophical perspective (Stahl, 1987, 1989b, 1991). The IC prefers the former labels because all cognitive operations, activities, abilities and products are viewed within a psychological rather than philosophical context. Consequently, for the IC the concepts of *knowing*, *knowledge* and *knower* are irrelevant to describing any aspect of an individual's mental functioning or the results of mental processes. Furthermore, the IC neither accepts nor rejects the notion of ultimate "Knowledge," "Truth," "Reality," etc. because these are philosophical concepts invented and used to answer questions within that domain of inquiry. The IC view must, however, be able to describe how one may come to acquire, reflect upon, reconsider, modify, and use "knowledge," "truth," etc. as these are defined within the various views of these human-invented concepts. Thus, if one insists that there is Knowledge, an external source of Knowledge, or an ultimate Knowledge, the IC view must account for the psychological factors that would give rise to such conceptions.

The IC emphasis on separating psychological from philosophical concepts and principles and maintaining a purely psychological constructivist perspective is unique. No other constructivist perspective seeks to do this. The IC perspective is a *psychological theory of thinking and learning* unhampered by philosophical concepts that tend to take educators away from the essentials of thinking, learning and acting.

For the IC, *information is the fundamental element (or ingredient) of all internally-directed brain-involved activity*, including cognitive, affective, and psychomotor constructs, operations, decisions and processes. Information that is stored permanently is contained within infoschemata, which are described at length later in this paper. Infoschemata are organized sets of stored information a person has invented and constructed in personally meaningful and viable ways as of a particular moment. Consequently, what one constructs, including one's concepts, conceptions, orientations and self concept, are organized, meaningful sets of information.

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[21] "Infobit" (plural, "infobits") is a term coined by Stahl in 1983 to denote any piece or bit of information or data.

Thinking and Learning: IC Constructs and Definitions for School Settings

Thinking is defined as any and all brain-related operations and events which handle, treat or involve information (Stahl, 1980, 1989, 1992a,b). A person cannot think in the present or about past or future states, behaviors, or phenomena without information. What a person is "thinking" at a particular moment is determined by what information is being consciously and nonconsciously considered, held, and used at that instant.[22] Contrary to popular notions and misconceptions, all thinking processes, including those associated with critical thinking, decision-making and problem solving strategies, metacognitive strategies, and inquiry, are information-based, -driven, and -producing (Stahl, 1980, 1988b). Furthermore, the action-behaviors a person engages in at a particular moment are determined by the information activated and directed to the muscles milliseconds before the behavior.

Given this definition, from prior to birth to the moment of death, individuals are always thinking. The concern for social studies teachers is not to encourage students "to think" as though they did not and could not "think" beforehand. The need is to help students engage successfully in appropriate academic tasks so that they acquire and use appropriate information in particular ways at appropriate moments. This information may concern any number of events or things, including significant topics, concepts, historical movements or figures, logical operations and rules, models and world views.

In spite of all their thinking students forget, as do teachers, supervisors and teacher educators. The majority of incoming and encountered infobits are not learned; that is, stored permanently. What teacher has not been dismayed to discover that which students appeared to have "learned" so well yesterday is no longer available within, much less accessible to, students the next day? As a general rule under typical classroom conditions, students lose as much as 70-90% of what they thought about during a class period or task within minutes to about 24 hours after the period has ended (Stahl, 1982). Social studies teachers can, however, arrange for learning tasks to reduce the quantity and quality of this loss, thereby significantly increasing the probability that more students will learn more of what they study in classroom settings. For example, Rosenshine and Stevens (1986) report that effective lesson closures and daily and weekly reviews, when done appropriately, are very functional in helping students store and retrieve important information has direct implications for teaching practices and learning in social studies classrooms. The key is that such closures and reviews be done appropriately. These are only two of a large number of teaching behaviors that can increase the quality of student outcome abilities resulting from social studies instruction.

Because humans forget, Stahl (1980, 1987b) has proposed the "23-hour rule" for use in school settings. If the student can recover and make use of particular information or an ability after a period of approximately 23 hours, then, and only then, can one infer that learning has occurred. This 23-hour period is used in school settings for two reasons. First, it reminds us, as teachers, that just because a student does something new in a class period on a particular day is no guarantee that the information, ability or behavior has been learned, i.e., is permanent. Second, students typically return to start the next class period of instruction for a course approximately 23 hours after they last left a particular class. Their learning may be interfered with or interrupted between these two class periods. In addition, students usually choose to forget large amounts of information and abilities throughout a class period as well as immediately after a class period has ended. Hence, this 23-hour period is viewed as a practical "rule of thumb" and suggests that in school situations the shortest length of time that needs to pass before a teacher can reasonably verify that the infobit or ability is permanent for the learner.

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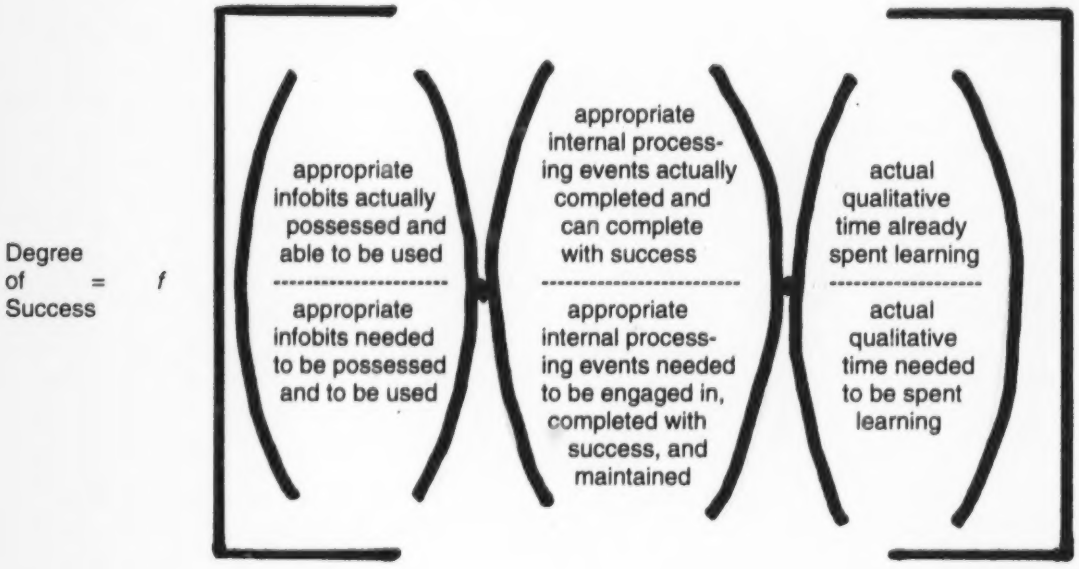
22 This assumes that there are no physiological problems or activity caused by foreign substances or an internal electro-chemical imbalance. In school settings, students must not be viewed as being unable to "think" or as never having "thought" before they engage in formal studies.

Given the above, *learning* is the acquiring (i.e., storing permanently) infobits, conceptions, perspectives or cognitive-beliefs or uses for one or more of these so that either are still in the learner 23 and more hours after their initial encounter or use.

Through appropriate instructional practices and activities, teachers can and may influence students' retention of targeted information and abilities beyond a class period by helping them rehearse and refine what they have been studying and by ensuring that students take the time to reflect upon their experiences in appropriate ways during the class period. With or without appropriate instruction, students will use, revise or augment their information bases and abilities.

The IC Model of School Learning

ICs are concerned with what learners need to have and do internally and need to be provided or encountered externally in order to significantly increase the probability each will have what each needs to be successful in any ability that is to be learned. One of the three critical variables each student needs to have is appropriate information. However, as the model below reveals, information in an of itself cannot ensure success in any social studies ability or task. The extent and quality of learning any ability students could acquire within social studies settings can be expressed in the following mathematical formula:[23]


Degree of Success = f
appropriate infobits actually possessed and able to be used
appropriate infobits needed to be possessed and to be used
appropriate internal processing events actually completed and can complete with success
appropriate internal processing events needed to be engaged in, completed with success, and maintained
actual qualitative time already spent learning
actual qualitative time needed to be spent learning

As this expression suggests, the three critical variables learners must have to be successful are (a) appropriate and sufficient infobits aligned with each targeted outcome ability, (b) appropriate and

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23 This model was initially generated and refined by Stahl in 1987 as an extension of Carroll's (1963, 1989) Model of School learning which contained only the time variable. The first formal paper presentation of the IC model was at the 1989 annual meeting of the American Educational Research Association in San Francisco (Stahl, 1989).

sufficient internal processing tasks completed and able to be completed,[24] and (c) qualitative time spent learning the infobits and abilities linked to them[25] (Stahl, 1989, 1990b, 1994a,b, 1995).

The degree of success in learning can range from 0 to 100%, with 100% representing the level of adequacy or proficiency that is acceptable at a particular moment. The three variables with the parentheses are ratios, not fractions. The bottom for each will always be 100%, while the top portion of each ration may range from 0 to 100%. To be 100% successful, the top part of each variable ratio must always be 100%. An overabundance in one area will never compensate for less than 100% of what the learner needs in the other two variables. For example, if students are lacking sufficient attributes of the concept of "justice" to correctly distinguish between examples and nonexamples of this concept, then giving them more examples or more time to look at the examples and nonexamples will not, in themselves, help students to make correct choices consistently over time. What they need is access, either directly or via invention, to these attributes. Yet, if they did have these attributes and did not comprehend them or spend sufficient time applying them over enough examples and nonexamples, then having the information will not, in itself, make them successful. These two instances also make it clear that asking students to spend more time trying to learn without giving them access to the information and processing tasks they need will not make them successful, no matter how hard they try and how long they take.

What is needed for the bottom parts of these variables will vary from one ability to another and from one student to another for the same ability (Stahl, 1987a, 1989, 1990b). Learners will vary at the beginning, during, and end of instruction in the extent to which they approach 100% for each of the three variables. As learners approach the 100% level for each variable for a particular ability, orientation, or action, they increase the quality of their success relative to it.

During instruction, each learner needs to acquire must-learn infobits, use and complete appropriate internal processing tasks, and to spend sufficient productive clock and calendar time acquiring and using both appropriate infobits and processing tasks. In addition, each learner needs descriptive, corrective, and supportive feedback concerning the extent to which she or he is actually acquiring the targeted infobits and associated abilities to the proficiency level expected. This feedback is part of the information each learner needs.

Among their critical duties, social studies teachers must diagnose, focus, monitor, measure, assess, correct and support learner progress toward acquiring both appropriate infobits and proficient use of these infobits in ways directly aligned with each permanent ability targeted.[26] Invariably, learners will differ in the quantity and quality of what they have and what they need to have to be successful in each of the three critical areas for each ability to be learned. Instruction will be effective to the extent it arranges for and enables learners access to the appropriate infobits, processing

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24 By "internal processing tasks" is meant the ways a person manipulates, uses or considers information.

25 The importance of this time factor was pointed out by Joyce and Showers (1988) who reported that teachers may need to practice a particular teaching technique during 15 to 25 class periods over as many separate days just to incorporate this one behavior into their routine way of thinking and behaving. Given the overwhelming empirical value of "spaced" or "distributed" practice over no or "massed" practice (e.g., Dempster, 1989), it is no wonder students forget so much in social studies classrooms. They simply never spend enough time in many class periods over several days to incorporate the information and ability to use this information into their on-going way of thinking and acting.

26 Apparently this is easier to say than to do. Colker (1984), for instance, interviewed and then observed teachers and found that they paid very little time or attention to monitoring student processing tasks and on-task learning efforts both in their planning for instruction and in their actual classroom behaviors.

events, and time each learner needs to be successful. For this reason, curriculum planners and instructional designers will want to decide beforehand what abilities, perspectives, or states students are to attain and maintain. Then, they must consider what infobits students must acquire and how students need to "think about and with" that information in order to increase the probability each student will actually attain each outcome expected.

This Model of School Learning is especially relevant to social studies education in at least five ways. First, it makes clear that the extent of success is not limited to the information the learner has, could, or should learn. Secondly, it proposes that success corresponds to and is dependent on the interrelationships among three distinct variables not one or two. Thirdly, it points out the importance of direct, outcomes-oriented alignment; that is, the model focuses attention on a very needed element of successful thinking and learning, the infobits and processing tasks directly aligned with the abilities students are to attain during and maintain long after the lesson or unit has ended. Fourth, it points out the need for curriculum planners and teachers to attend to, but not be limited to, the must-learn information bases underlying each task and subtask and to provide students necessary and sufficient opportunities to process this information and to spend the time each needs with the outcome aligned information each needs to invent, construct, and use to be successful. Finally, the instructional situation must build in appropriate information recycling/rehearsal activities over an extended number of days if the desired ability is to be refined as well as be maintained.

Reasons for stressing information as an integral element of constructivist thought

The IC emphasis on information enables educators to focus on tangible, highly describable, manageable, and measurable ingredients of thinking, learning, emotions, and behaviors which in turn allows them to attend to the basic element of all cognition, information. Since thinking and acting are based in and require information, the focus of curriculum and instruction must be to assist students invent, organize, store, and become functionally-proficient at using appropriate information in appropriate ways at the appropriate moments and places. Other reasons why the IC pays so much attention to information will become more clear in the sections that follow.

Each learner and the multiple internal activities associated with thinking and learning are viewed as being dynamic, active, and constantly making decisions whereby personal versions of the world, others, reality, and self are constantly being generated, constructed, tested and applied (Stahl 1982, 1987b,c, 1989, 1990a,b). Each student alone and invisibly decides what phenomena, entities, and data are to be attended to and how each infobit will be made meaningful and be organized. The student also decides, almost always nonconsciously, how already permanently stored information, constructed and arranged into personal versions, will be used to "make sense" of and assign meaning to encountered entities and data and well as to decide whether something is or is not a problem or worthy of further attention.

All individuals assign meaning to the information and phenomena they encounter and to the information and conceptions they generate internally. This meaning and this meaning alone influences personal judgments concerning the sense some thing has for the learner - whether the thing has just been encountered, is being encountered, or has been recovered from Permanent Storage and is being represented, re-presented, and reconsidered. All meanings, perceptions, conceptions, and the results of "sense-making" decision-making events take the form of information which the learner either stores or allows to be forgotten. For the IC, all memories are actually collections of infobits representing decisions a person made at a previous time which have been stored and which are retrieved in combination with other infobits the person activates at the moment of recollection and re-presentation. Putting it quite simply, humans do not and cannot store actual

past or present experiences, emotions, or behaviors: they are only able to store infobits from, in, and about each of these as each learner perceived them to have been, at the moment of storage.[27]

In typical classrooms, students as active knowers and processors are always using, manipulating, generating, and organizing information. These activities may be but are not always aligned with the information students need to process or the abilities they are expected to acquire and maintain. As students engage in these processing activities, they assign their own meaning to entities, phenomena, constructions, and data in their efforts to make sense of them from their own point of view. Because this "sense making" is part of and a result of other infobits they retrieve and use at that moment, it is probable that 25 students in a particular classroom will generate different constructs of the phenomena or set of data being studied. These differences can range from being very small to being extremely diverse. In their efforts, these students are actively constructing, revising, transforming, creating, and testing their personal versions of what they "thought" they studied to form a set of organized infobits from and about their experiences.[28]

What students experience; construct as representations of phenomena and entities and the information considered about them; store; and later retrieve and remember may be quite different from what their teachers expect. An example may be seen in situations where a student diligently spent time and effort to complete an assignment in a very different way than the teacher intended. When asked why he did what he did, the student begins with "I thought you said . . . ." This "I thought you said" comment reflects the construed meaning of what the teacher said as the student interpreted the teacher's directions. And, once construed and accepted as being consistent with what was said, students, like adults, operate as though this was, for all practical purposes, what was said. This construal and construction occurs whenever students engage in paraphrasing, translating, summarizing, and interpreting data, phenomena and tasks. Because these results may differ considerably from what the information or material contain, teachers must pay more attention to the results of these constructive efforts rather than take it for granted that "smart" students automatically will and can do these correctly and less able students can't or won't learn to do these constructing tasks correctly.

It cannot be overemphasized that students do not take in or store intact the meanings, value and importance that teachers personally assign to phenomena, the world and data. Only the meanings, versions, value, and importance each student personally assigns to these as she perceives them to be from her own perspective are permanently stored. One implication of this individual and idiosyncratic "sense making" is that personally construed interpretations and meanings teachers assign to data, rules and phenomena can *never be directly transferred into* students. Rather, teachers must ensure students interact actively with the information from and about targeted phenomena and data so that each student construes, makes sense of, and makes appropriate decisions about these in ways that are *viable* and *functional* within the context and given the information available.

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27 These experiences may also have different contents, meanings, sequences, and elements at the time they are retrieved and reconstructed in later situations and/or other circumstances (e.g., Bartlett, 1932; Erdelyi, 1974; Loftus, 1975)

28 Forgetting, i.e., the failing to recover or maintain an infobit or ability, does not occur for only one reason or in only one set of conditions. There are at least eleven places or ways learners may "forget" information or an ability.

Social and Behavioral Scientists Have Been Using Particular Assumptions and Conceptions Associated With Contemporary Cognitive Psychology: Illustrative Examples

The constructivist perspective of learners as personally assigning, generating and constructing meaning to what they encounter and consider is directly relevant to the teaching and learning of the social studies/sciences. Even though they have little interest or formal training in cognitive psychology, the cognitive psychology and a constructivist perspective is not new to the vast majority social sciences and is becoming increasingly the view of scholars and leading educators in the physical sciences (Novak, 1990)..

Over the past 150 years the majority of scholars in every academic discipline in the social and behavioral sciences either never willingly followed or has abandoned the credibility of and strict adherence to empiricist, deterministic and/or positivist notions of an external source and absoluteness of "reality" and "knowledge," turning instead to the view that each individual constructs his or her own world, reality, and knowledge that may or may not correspond to actual phenomena and to socially and culturally constructed perspectives. Throughout this period, especially in this century, leading scholars have either written directly in favor of or explicitly used perspectives or rationales that clearly are consistent with conceptions of contemporary cognitive psychology as provided above.

As early as 1910, Carl Becker argued that the facts of history do not exist until the historian creates them: a claim that directly contradicts the conception of the role and nature of "facts" that a number of historians held at the time.[29] Two years later, Robinson provided a perspective on what would become the "new history;" a perspective that stressed the individual's personal involvement in forming, selecting and interpreting data and phenomenon. Later, Becker (1955, 1966[30]) asserted that "history" exists within each individual and exists when a person considers past data and occurrences in his or her own way and generates personal interpretations of them. This "history" consists of the interpretations and supporting data one generates about past events and the past. From his perspective, each person is an historian. By the mid-1930s, Charles A. Beard, President of the American Historical Association (1935) publicly advocated a similar perspective for history. While, very late in his career, Barraclough (1955) came to advocate a similar position by stating the history one reads, although based on data, is, strictly speaking, not factual at all. Rather, data and facts in versions about and from past occurrences should be viewed as being nothing more than a set of accepted judgments.

Other historians have acknowledged that there is an interaction between a subjective observer and data from and about what occurred in the past (Beard, 1934, Collingwood, 1946; Croce, 1941, 1960; Lewis, 1975; Lowenthal, 1985). For them, the framing and interpretation of a historical event is something determined by the historian in his or her present time. Furthermore, the existence and significance of an historical event within a scholarly community is determined only after other historians are convinced that the topic and explanation as interpreted illuminates the human condition within the perspective of historical time (Carr, 1961).

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29 This paper is not intended to be a review of the literature of historiography and related topics. Indeed, the entire field of historiography represents a contrast of personal perspectives and interpretations, illustrating quite clearly that historians as well as those who have attempted to 'record history' have spent centuries dealing with the notion of personally constructed versions of the past and with what guidelines ought to be followed in doing and inventing history. For those interested in more on this topic, Lewis (1975), Carr (1962), and Kinnell (1987) are excellent sources

30 While these sources are relatively current, the actual presentations upon which these articles were based occurred in the 1920s and 1930s

Carr (1961) claimed that what constitutes historical facts is determined by the individual, that history if the result of the interaction between a person and the data reviewed, that "lessons" are derived by historians in the form of their personally constructed interpretations and are not given or taught by 'history,' and that each historian constructs an event according to his or her own biases, values, and subjective perspectives regardless of how much she or he may work to control or reduce the affects of these personal orientations. This is one major reason why Croce (1941) claimed that "all history is contemporary." Carr (1961) went further by suggesting that "history does not belong to the past but to the present." (p. 29). It was in this sense that Croce (1960) contended that "all history is contemporary," meaning that present day concerns and the existing mind-set of the observer influence what is chosen to be studied and what meanings and interpretations are assigned and accepted. To teach students to invent, use, and test meanings and constructs of events under appropriate conditions using appropriate standards and guidelines is to teach history and all the other social and behavioral sciences.

The vast majority of today's historians have abandoned the belief that an "ultimate history can eventually be known and written"[31] to a perspective that such a history is impossible regardless of how much data we had, how much time was spent in developing this "history," and the quality of the historians who worked on the project. However, these historians did not believe that individuals were free to generate any facts, interpretations, or lessons from or about the past as history. While it was the task of historians to study data and invent history via interpretations, the version that is invented must be consistent with the data. Contrary to the potential problems that may arise out of an extreme commitment to Collingwood's (1946) position, historians (including social studies students) have no infinity of meanings or interpretations that they invent and advocate. Interpretations and meanings must be supported logically by the physical evidence and, as much as possible, be formed and defended on grounds that transcend the inventor's biases and value system (e.g., see Carr, 1961; Isenberg, 1985; Kinnell, 1987). These and other compatible notions are further elaborated upon by numerous historians, including for example, Fischer's (1971) Historical Fallacies, in Lewis's (1975) History: Recovered, Remembered, Invented, and Kinnell's (1987) Historiography.

This invention perspective is not limited to history and historians.

Each geographer must invent his or her own region and demonstrate the significance of this region and subsequent analysis and explication of the region so invented (Murphey, 1982). Each geographer studying the Caribbean region, to cite but one example, develops a set of attributes which together represent his/her construct of this region. He/she will then study the region, in all probability map various aspects of the region, and proceed to use his/her construct in order to organize and report findings. To enable students to invent and then analyze regions, using tools such as concepts and maps, is a major part of what it means to *teach geography*. This is to say that geography is a way of assigning meaning to and making sense of space.

Anthropology is founded on a theory of culture. Anthropologists do not do field work merely to describe the behaviors of persons belonging to other cultures or to organize these behaviors into patterns of behaviors. As participant observers and as scholars, anthropologists invent cultural orientations and concepts which enable them and others to perceive, experience, and to value behaviors and patterns of behavior as these are seen, felt and valued by members of the culture they are studying (Benedict, 1974; Nakane, 1973; Wagley, 1968).[32] For contemporary anthropologists, a society's culture is not the set of behaviors and material artifacts its people use; rather culture is what

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31 This claim was made by Acton (1907) in The Cambridge modern history: Its origin, authorship and production. Cambridge: Cambridge University Press. pp. 10-12.

32 Individuals interested in reviewing some of the ideas and arguments related to the discussion concerning traditional and contemporary perspectives of "what is anthropology?" and "what is the task of the anthropologist?" may want to read, for example, Aberle (1987), Freeman, Romney, Kimball and Freeman (1987), O'Meara (1989), and Vallacher and Wegner (1987)

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these people 'have in their minds' as to what one has to know, do, and believe in order to operate in a manner acceptable within the group (Goodenough, 1957). In other words, a people's and therefore one's culture is the mental representation a person possesses concerning what one is expected to think and how one is expected to act. To help students use appropriate guidelines and standards to invent, verify, and use appropriate cultural concepts and orientations, for comprehending and studying both their own and the cultures of others, is to *teach anthropology* - and to teach them to *think anthropologically*.

That social studies students will impose personal meaning and constructs on the events and infobits (or pieces of information) they study in history courses and the spaces and infobits they study in geography courses, as examples, is critically important because these meaning and constructs directly affect what students are likely to process and learn. Furthermore, each student is a member of a society and a participant in a culture. From their interactions with their society and with their culture, they acquire orientations, ways of viewing events, and bases for assigning meaning. These 'common sense' orientations, these ways of listening, talking, thinking and comprehending, and these ways of assigning meaning and making sense of the world may and often do conflict with the discipline-based orientations. These discipline orientations need to be employed if students are to understand historical events, human activity in physical spaces, or other social science data as social scientists would interpret and explain them. In other words, the conventional or common sense ways of viewing events and information used by the members of the society at large are usually inconsistent with the ways members of the social and behavioral science disciplines would view and assign meaning to the same events and information.

To comprehend and understand phenomenon using appropriate social and behavioral science conceptions, students must acquire an ability to view past and present as well as speculate about future phenomena in a manner different from interpretations and meanings were they not to comprehend and interpret data from discipline-based conceptions (e.g., Casteel & Yager, 1966). For example, to comprehend accurately geographical spaces and movements, students must acquire an ability to view spatial phenomena, whether in regional or spatial form, in ways that differ and often conflict with common-sense perceptions and meanings. In a second instance, to attain global understanding, students must perceive situations, behaviors, and conditions using expectations, conceptions, and world views which differ dramatically with the ethnocentric assumptions which tend to pervade the North American world view (Casteel & Guthrie, 1980; Commager, 1982, 1966). Therefore, merely increasing the sheer amount of information a student encounters and acquires about Latin Americans and Latin America, for instance, is, in itself, not likely to lead to an increased ability to comprehend and appreciate Latin Americans, from the perspectives that make them uniquely Latin Americans (Casteel, 1989a; Casteel & Guthrie, 1980; Casteel & Williford, 1976). These data neither speak for themselves nor guarantee appropriate comprehension and interpretations will result (Becker, 1966; Murphey, 1982). Adding to the amount of information a student possesses about the Jeffersonians is not a guarantee of increased accuracy in his or her comprehension. For instance, to more adequately comprehend the National Period of United States history, its personages, and its events, one must seek to find once again "the lost world of Thomas Jefferson" (Boorstin, 1981).

The above reveals that many assumptions and conceptions associated with one or more cognitive psychology perspectives are widely accepted and advocated within as well as across the social and behavioral sciences. For instance, social scientists do accept that what individuals bring to their inquiry and interpretive tasks and what goes inside their minds play significant roles in the efforts to construct viable representations, reconstructions and interpretations of what they choose to study.

THE INFORMATION-CONSTRUCTIVIST PERSPECTIVE APPLIED TO THE STUDY AND LEARNING OF "HISTORY:" AN EXAMPLE OF THE IMPLICATIONS OF A CONSTRUCTIVIST PERSPECTIVE FOR ONE AREA OF THE SOCIAL STUDIES

To this point, the paper has concerned itself with the details of the change over time of different perspectives associated with thinking and learning and with how social scientists currently view their respective fields and endeavors. This section provides a more in-depth examination of the application of one perspective, that of the Information-Constructivist, on the study and learning of "history" to illustrate the implications of a cognitive psychology perspective for the social sciences and social studies educators.

Context and Background

Because past occurrences, being what they are, have vanished and are not reproducible, we are left with very few physical traces to use to verify, much less reconstruct what actually occurred in the manner and sequence that it occurred. Therefore, we are forced to use our present-day minds to consider whether something did occur and then to imagine and construct (a) what did occur; (b) when, where and how things occurred; (c) why what occurred took place in the particular context(s), location(s), manner and time(s) that it did; and (d) what the significance of these occurrences was and is. If this effort is to be more than an enumeration of quantities of verifiable bits and pieces of descriptive details -(i.e., what might be called the "facts of the past"), a person must make large numbers of decisions to invent and construct a contemporary yet appropriate version of targeted past occurrences. These versions are not the past or the occurrences themselves; they merely represent what each individual has invented about what took place "back then." Each version, always constructed internally first, may be externally documented in written narratives, such as in textbooks.

In typical history courses, the "history" encountered and to be learned is nearly always the reported constructions and interpretations about the past someone else has invented. In these courses, survey textbooks and teacher lectures are students' primary sources of information for constructing and reconstructing past occurrences in their own minds. These textbooks and lectures vary primarily in quantity of infobits than in the variety and quality of interpretations and explanations of past occurrences.

Unfortunately, students are not encouraged to actively build dynamic constructions and interpretations in their minds of what particular occurrences were like as they happened in times past. Instead, students tend to think about past occurrences in terms of the verbal data they have encountered about targeted occurrences. As a result, students' comprehensions and interpretations tend to be overly-simplified capsules, hasty generalizations, and superficial conceptions of past occurrences in pretty much the same form as reported in their texts or from their instructors. In addition, students are rarely helped to acquire conceptions and methodologies used by discipline-based professionals. Even rarer are opportunities for students to practice applying these discipline-based concepts and methodologies to construct viable, sound versions, interpretations, and explanations of past occurrences, people, and artifacts. Consequently, students build sets of sequenced infobits which conform quite remarkably to the sequence of information encountered in texts and lectures as this information was presented. In such settings students learn to be more but usually less successful enumerators of information about the past rather than active constructors and explainers of the occurrences they study.

Students can learn to construct sound versions of past occurrences in their minds. Few students have had formal assistance from history or social science teachers who are responsible for facilitating

their systematic generation of personal versions and explanations of past occurrences.[33] Unless students are assisted in being active and reflective constructors of viable versions of the past and of sound explanations of these occurrences, they are not likely to find the past or past occurrences meaningful and worth studying both in the present or future.

Interest in the study of things in, of, from, or about *the past*

A concern for the past and what happened in the past, particularly the past prior to one's own lifetime, is neither innate nor automatic as one grows up. If individuals are to study and learn about -- or from -- past occurrences, they must have personally meaningful reasons for doing so. These reasons should not be, as this author has heard so often in classroom observations, due to misconceptions such as "history repeats itself;" expectations of revealed truths such as "we learn lessons from history;" or school-specific reasons, such as "it's on the test," "you'll need it for college," "you need it to pass the test to graduate," etc.

Attention to the past is an acquired concern a person generates for herself because she has decided that there are good reasons for "having the past" in her mind. The reasons for this concern and study must convince each person that there is something important to be gained by "looking into the past." In essence, individuals must persuade themselves that this concern and study are well worth the effort, time, and energy needed to generate, refine, augment, revise, organize, and store large quantities of information and conceptions about past occurrences that themselves can never be directly observed or made to reoccur.[34]

The question "Why study or learn about the past?" should not be answered hastily. We may, for instance, provide an answer claiming that humans have always been intensely interested in the past. Both a deep involvement and interest in the past and past occurrences as distinct in both time and mind from the present and a belief that what occurred in the past is meaningful outside a religious or literary context are relatively recent phenomena in Western civilization, including in the United States.

We must keep in mind that the notion of attending to something past prior to one's own life time as distinct from the present was not widely held by people in the Western world until the early 1800s (Lowenthal, 1985). Prior to that time, interest in things past was primarily associated with theology, story telling, legends, myths, philosophy, and literature. So while there have always been people who did want to know about and were interested in what occurred in the past, before the early 1800s these people represented an extremely small proportion of the population of any age and culture. Then, as now, each had his or her personal subjective reasons to explore, value or devalue, hold on to, and use "the past" and to make sense of past occurrences (Lowenthal, 1985).

Even today, a large number of people have not come to accept that information about past occurrences is relevant to contemporary times -- a marked contrast to those who accept with great faith the assumed inherent independent "wisdoms," "lessons" and "truths" taught by the past (Lowenthal, 1995). Teachers of history rarely consider that most people in Western society find most things of the past to be boring, of little value, and meaningless even <u>after</u> they spent years in classrooms studying "history."

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33 Newmann (1977) and Sellers (1966, 1969) have asserted that teachers of history have an intellectual responsibility to understand what they are doing and need to be doing as well as the reasons why for both.

34 Incidentally, research by Elizabeth Loftus (1980) reveals that we have difficulty accurately reconstructing, interpreting, and explaining past occurrences that we observed as eye witnesses. If this is so, then we must be doubly careful not to form hasty conclusions about past occurrences that we did not witness firsthand as they were happening.

What is *History?*

The cognitive perspective makes clear the individuals invent their own concepts, that may or may not be aligned with prevailing conceptions. That we do invent personalized concepts is made very clear in the variety and range of definitions of "history." Below are representative conceptions of "history" that are descriptive as well as functional in helping to separate that which *is* and *was* and that which *is not* and *was not* "history," and to answer the question "what is history?".

a) **history as hard physical evidence, such as records, documents, and artifacts.** This notion equates history as being the actual objects, documents, diaries, buildings, tools, and symbols which provide evidence of one or more past occurrences. This physical evidence represents actions of humans in some time, context and place. History as records and artifacts includes physical objects that cannot be stored in a person's brain as is or be represented in the mind free of subjective meanings assigned by that person.

b) **history as past actualities** (or as actual past occurrences as they happened in the way they happened). This notion equates history as being the actual occurrences, thoughts, actions, emotions, statements, and symbol-making activities by humans or which affected humans that happened or existed prior to the present.[35] In this sense, history is what actually occurred "out there back then," and the best that humans can do is to reconstruct these happenings. From this conception, the closer we can reconstruct what occurs, the closer we come to an accurate and true history.

c) **history as non-narrative, discrete information about, of, or from past occurrences and things.** This conception equates history as being the specific, separate bits of information, often mistakenly called "facts," that exist about or from the past. These infobits are what a person may encounter or has about actual or invented past occurrences, people, actions, or things. In this sense, to learn and know history requires one to find, store, and report information from or about past occurrences that is included in textbooks, films, audiocassette recordings, documents, etc.[36]

While it is possible to assemble a large number of neutral, objective, and agreed upon "facts" as descriptive narrations of assumed past occurrences, the sheer enumeration of these "facts" is often viewed as "having a history" or "knowing the history" of the targeted occurrences. Unfortunately, this view of sheer enumeration is supported by many teachers who believe that presenting and recalling enumerated details in chronological sequence is what it means to "teach," "know," and "learn" "history" (Stahl, 1990, 1991). In the ranks of professional historians, any enumeration of such infobits must be interspersed with the historian's interpretations and explanations of what occurred; how what occurred occurred as it did; and why it occurred in that manner, at that time and in the context in which it occurred.

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35 Usually "history" is viewed as being limited to human existence on this planet, with the terms "prehistory" and "prehistoric" used to refer to occurrences prior to the existence of humans. However, expressions such as the "history of the solar system," "history of the dinosaurs," and "history of the world" suggests that those outside the study of the human past view history to mean any time in the past regardless of the involvement of humans. (also see Fischer, 1970; Lowenthal, 1985).

36 Other definitions have been proposed among which are that history is (a) a narration of past events such as accounts, tales, and stories; (b) a relation of incidents; (c) a series of events of which a story is told or may be told; and (d) a systematic narrative of past events usually in chronological order (Simpson & Weiner, 1989).

d) **history as self-constructed versions of and about past occurrences that are "in and of the mind,"** This notion rejects history as being the actual occurrences as they happened, as the physical evidence, or as the contents of documents and other records. Rather, this "history" consists of the constructions, interpretations, and explanations of and about past people, actions and things that people invent and construct in their brains. These idiosyncratic "histories" are stored in the mind in organized clusters of information called infoschemata.[37] Consequently, there is no history "out there" to be studied and learned. History can only exist in one's mind as one has constructed past occurrences to be and to mean. In this sense, America never had and never would have a history and American history did not and does not exist until a human invents it. Furthermore, in a nation of 250 million people, there exist 250 million histories of America--not one history that is out there to be found, taught, and learned.

These individually invented and stored constructed versions may or may not be the products of the correct use of appropriate methods of inquiry, interpretation, verification, evidence, or criticism. They may not reflect acceptable uses of relevant artifacts and records. Whatever the circumstances, past occurrences must be generated, invented, constructed, verified, and preserved in the mind of each individual as he or she perceives them to have been. In this sense, people are like cognitive engineers who are about the business of constructing versions of and about the past that must be supported, may be challenged, are subject to revisions, and may crumble or collapse -- or endure till death. This view is why we can say that the past as you know it will die when you die.

Among members of the professional community of historians and the majority of teachers of history, the closer that one's mental constructions "reconstruct" past occurrences as they happened in the way that they happened, the more that one can claim to "know" history. Those versions that deviate from an accurate, comprehensive and appropriate construction are criticized for being quasihistorical, ahistorical, nonhistorical, pseudohistorical, fictitious, naive, novice-generated, wrong, or inappropriate. Of course the standards used to judge one's version are almost always the versions others have invented.[38] In every case, the history (i.e., the constructed version) that a person holds is accurate and certain from his or her point of view at least at that moment.

e) **history as a record of one's constructions of and about the past.** This notion equates history as being all the recorded statements that report a person's versions of the past occurrences. These reports are usually in the form of lecture notes, test answers, textbooks, trade books, journal articles, conference papers, term papers, theses, dissertations, oral histories, documentaries, etc. These statements are always by-products of history-as-constructed-in-the-mind of one or more persons. The actual contents, format, style, etc. of the disclosed version are often shaped by the needs or demands of the medium in which the version is presented or preserved. For reasons to be explicated later, any documentary or recorded version of an event or thing cannot be a cold, neutral, unbiased, objective, and undistorted description of past actualities.

f) **history as a story of past occurrences, people, and things.** This conception considers history to be story; a story, however, that takes the form of an extensive narrative report of happenings and not a story that meets the literary demands of stories. Contrary to literary

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37 A major part of this paper addresses infoschemata and their characteristics, features, and roles in thinking and learning of and about past occurrences.

38 The controversy surrounding the Warren Commission Report concerning the assassination of President John F. Kennedy and other "histories," such as Oliver Stone's movie J. F. K., provides an excellent example of how constructed versions of past occurrences are typically found to be acceptable or nonacceptable in terms of the constructed versions of others

stories that must have plots, climaxes, etc., history as story consists of descriptive narrations of interrelated occurrences presented in chronological order.

g) **history is any study of or inquiry into past occurrences.**

These conceptions provide alternative answers to the same question. They represent common perspectives as to the nature of history that are likely to be held by teachers and students at all levels. The Information-Constructivist accepts the fourth option as the most viable answer to the target question.

Unfortunately, in the typical history course the "history" students encounter and are to learn is largely "history as information about, of, or from the past" as included in their textbooks, teacher lecturettes, and documents. In these courses, students are typically labeled as being successful to the extent they (1) avoid constructing subjective "histories" resulting from their interpretations and (2) store presented "facts" intact so that they may be recalled for class discussions and tests. The presented "facts" may include sequence, interpretations and explanations; but students are expected to limit their interactions with the available data so that they essentially construct, store and recall the version that is presented. For too many teachers, students fail to "grasp," interpret and explain targeted past occurrences when they fail to reproduce important details about the version-as-presented. This failure at reproduction is then interpreted to mean that students do not "know" or "understand" history.[39]

The "history" (or version of the past) that makes the difference

Within the Information-Constructivist (IC) view, the history that is critical for students and to citizens in any country, the history that will influence peoples' thinking, learning, decisions, and actions in their own lives in the present and the future, is the subjective version of past occurrences they have constructed in their minds. For them this is the past as it happened and that has meaning for them. One major reason why this constructed version is so important and powerful is that the past occurrences to which it refers can never reoccur, be observed objectively, or be re-lived as they occurred in the same time, place, and context in which they occurred. The past that occurred, that is important, and that is history for all individuals all of the time is the constructed version that they have in their minds in terms of what they think and believe. Consequently, asking individuals to change their thinking about a past event is asking them to change *history* itself.

Each of the above conceptions requires a distinct way of approaching and teaching individuals either who want to or don't want to learn about past occurrences. In every case, what people learn about the past is interrelated with how they learn anything. What and how much they learn is influenced by what they bring to the learning situation, what occurs during it, and what they do following their learning effort. All relevant information processing events occur in the brain, including the storage of all information and constructed versions as histories.

The IC perspective describes critical elements and activities of the human information processing system that can be used to comprehend many aspects of learning "history" as well as what is involved in reconstructing, interpreting, and learning about things past. This perspective not only is relevant to comprehending the human as thinker and learner, it sheds light on the human as inventor, constructor, reconstructor, verifier and interpreter of data and occurrences whether these be in or about the past, present or future.

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[39] It is impossible to store infobits about a past occurrence without forming some form of constructed version of it. The point here is that such versions are fundamentally collections of descriptive details and reported interpretations and explanations. These constructed versions are relatively sterile in that their meanings reflect very little self-initiated interpretations and explanations while maintaining as much as possible the content encountered in outside sources.

Thinking About, Constructing and Learning "History:" The IC Perspective

One cannot learn another's history in the sense that this "history" can be transferred directly into or absorbed by the learner. To learn history is to acquire new information, acquire one or more new infoschemata, or make changes in existing infoschemata pertaining to constructed versions of past occurrences such that these exist within the person 23 and more hours beyond the period where these were first encountered or done.[40] Learning history is more than merely thinking about past occurrences; changing one's behavior or conceptions; inventing new opinions, interpretations, or versions of the past; or considering new information in fun or exciting ways for the first time. Instead, learning involves an active series of appropriate internal processing events each person completes in order that the information considered in the construction and interpretation of past occurrences is stored in Permanent Storage.[41] "Learned history" means that constructed versions, interpretations, and explanations are in Permanent Storage; a condition that cannot be confirmed until the 23 hour waiting period has ended.

Students in history courses are always using, manipulating, generating, and organizing information. As they do so they assign meaning to occurrences, artifacts, constructions and data in their efforts to make sense of them from their own point of view. This "sense making" is part of and a result of other infobits retrieved and used at that moment. In their efforts, students are actively constructing, revising, transforming, creating, and testing their personal versions of what they "thought" they studied to form a set of organized infobits from and about their experiences.[42] The 30 students in a particular classroom will generate 30 idiosyncratic versions of the phenomena, occurrences, or set of data being studied. These differences can range from being very small to being extremely diverse. Students do not store the meanings, value, and importance that teachers personally assign to past events or artifacts and their teachers' interpretations of these. Only the meanings, value and importance each student personally assigns to these occurrences and data as he or she perceives them to be from her own perspective will be permanently stored. Consequently, what students construct as representations of past occurrences, include as infobits about these occurrences, store, and later retrieve and remember may be quite different than what their teacher expected and wanted.

One implication of this individual, idiosyncratic "sense making" is that personally-construed constructions historians and teachers assign to occurrences, data, and artifacts can never be directly transferred into or absorbed by students. Rather, students must interact actively with the information

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40 Again, the 23-hour period is a stipulative rule-of-thumb time period for classroom use since typically in precollege settings students do not return to the same classroom until approximately 23 hours after the end of the previous class. This time period is used to counter the assumption that many teachers have that one students have seen, heard, written, or said particular data or completed a particular task, the students have stored the data or ability permanently. In addition, there is some physiological evidence that electrical impulses that are assumed to carry new data through the neural system can dissipate or be lost after being active for 45 and more minutes. This view runs in sharp contrast to the standard notion that whatever infobits are still with the learner after 30 seconds is in Permanent Storage forever and failure to remember them after that point is entirely an access and retrieval problem.

41 Permanent Storage is not the same set of mental operations or the same "place" in the information processing system as Long Term Memory (Stahl, 1983, 1992a). Permanent Storage has a different role and set of functions than those associated with Long Term Memory. The two should never be viewed as being equivalent.

42 There are at least eleven places or ways which students may forget information or an ability. Forgetting, i.e., the failing to recover or maintain an infobit or ability, does not occur for only one reason or in only one set of conditions.

from and about past occurrences so that they can construe, make sense of, and make appropriate decisions about these occurrences.

Teachers of history can provide environments which enable students to think about past occurrences as a scholar might (or should). They need to provide instructional conditions and environments wherein students are helped to think about past occurrences and their interpretations in ways that are consistent with meanings derived from the correct use of appropriate historical conceptions, methods of inquiry, and orientations. To teach "history" and how to think historically requires helping individuals systematically consider past occurrences, artifacts and infobits using discipline-based tools and concepts. "Covering" the past as is traditionally done in history courses is, therefore, not teaching history but teaching infobits that represent someone else's history.

Appropriate interpretative and construction activities involve far more than merely adding accepted data to a blank slate in a particular order. These internal activities involve building organized clusters of information and using them to enable that person to make sense of and function in the world that the person perceives exists (Stahl, 1989). People think with and about information and extract, construct, and store information from and about past occurrences and experiences as personally organized sets of clusters of information (i.e., infoschema). They then use these sets of infobits to create and manage their thinking about new situations, artifacts, or past occurrences. This critical variable, infoschemata, and an equally important one, cognitive-beliefs, are described in the next two sections.

Infoschemata

All the infobits about past occurrences individuals have permanently acquired are not stored in a random, disorganized, or haphazard fashion. All infobits in Permanent Storage are nonconsciously placed in an orderly manner among existing infobits, either in existing clusters of infobits or as part of a new cluster. A set of interrelated and organized clusters of infobits focusing around the same topic, issue, or entity is called an infoschema (plural, infoschemata); the "info" is used as a constant reminder that each infoschema is composed of information. Each infoschema is an internally invented and constructed set of two or more organized, interrelated clusters of infobits concerning a particular topic, issue, or entity. Each cluster and the set of clusters collectively may or may not contain complete, correct, adequate or appropriate information. These clusters and infoschemata vary in the quality, quantity, endurance, and strength of the interconnections each has with the focus of the infoschema, other clusters in the same infoschema, and clusters in other relevant infoschemata. Characteristics of infoschemata are included in Tables 1 and 2.[43]

Tables 1 and 2 about here

Infoschemata are not physical things in the brain. Rather, an infoschema is a theoretical construct invented to describe and explain what seems to exist and function within all humans nearly all of the time.

Infoschemata do not simply appear from nowhere as though created by magic or absorbed from the environment. Each is the direct result of numerous nonconscious decisions made about what to do with the infobits that each individual has decided to keep in Permanent Storage. Each infoschema is a personally-constructed product from, of and about the learner's experiences as she perceived them to be at the moment of storage. Individuals can, and often do, alter their original conceptions and infoschemata within hours, days, and months of the formation of an infoschema and its respective conception (e.g., LeSourd, 1989).

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[43] There is no assumed or implied priority, sequence or rank ordering of the characteristics presented in the narrative or in any of the listings in Tables 1-5.

Table 1.
Characteristics common all infoschemata.

a) Each infoschema is a set of clusters of information. Each includes two or more clusters of infobits which the person perceives as being associated with the same topic, theme or thing.

b) By augmentation, the typical infoschema includes far more than two clusters of relevant information. Infoschemata individuals construct about past occurrences range from containing a very limited to an extensive number of clusters of infobits.

c) The clusters of infobits within a particular infoschema are interconnected and networked. This interconnectedness makes it possible, at least theoretically, for infobits in one cluster to cue or activate information from any other cluster in the same infoschema. The strength of the connections among clusters in the same infoschema typically varies from one to another. Because they are determined internally and unconsciously by each person, the interconnections and the strength of each connection among clusters of infobits within a single infoschema may change over time.

d) An infoschema is linked to situations and topics to which it is perceived by the person as being applicable. Even though a person has an appropriate and adequate infoschema and has connected it to various situations where the infoschema is appropriate does not guarantee it will actually be applied when and where it should be applied.

e) Each infoschema is linked with one or more infoschema(ta); consequently, no infoschema is isolated from all other infoschemata. Each infoschema is interconnected and interrelated with one or more other infoschemata such that the retrieval and use of one infoschema is likely to prompt the retrieval and use of other infoschemata to which it is connected. These interconnections are acquired and may change.

f) Infoschemata may have equal status with other infoschemata, may encompass other infoschemata, and may be subsumed within broader, more encompassing infoschemata. The relationships between and among infoschemata extend beyond their interconnections or linkages. The relationships among infoschemata may be temporary or permanent, may change with use and over time, and may be augmented by new associations.

g) Once activated, an infoschema influences the reception, selection, processing and acquisition of particular infobits and the distortion and forgetting of other infobits. As an infoschema is being used, it is enriched and modified as a result of this usage. This change may be minimal in that few new pieces of information are added to it to larger scale modifications including the addition of one or more major clusters, the changing of the linkages among the clusters, or the changing of infobits in existing construction to make it compatible with newly-encountered infobits, artifacts and occurrences being studied.

h) Each infoschema is unique, and each instance of an infoschema's usage is a unique first time activation of that infoschema. Because infoschemata are dynamic, because they vary in richness, because they are linked to situations, because they are both embedded and embedding in broader infoschemata, and because they are dynamic and robust in nature, no two pastologists will ever possess exactly the same infoschema or cluster of infoschemata.

Table 1. (Continued)

i) Infoschemata which contain algorithmic information are more likely to be functional to "sense-making," learning and success in new situations than are those which lack such information. Algorithmic or procedural information provides individuals with step-by-step guidelines as to what to do in a particular order so that particular tasks associated with it can be completed. The lack of appropriate algorithms and linkages usually prevents people from applying relevant information to a particular construction task, interpretation or criticism.

j) An infoschema most typically is used concurrently with other infoschemata in order for the person to function in particular situations, such as in constructing and describing past occurrences as they seemed to have happened. An infoschema is rarely activated to operate alone as a person tries to function in and adapt to his or her world. A person's language and culture infoschemata are always functioning as are many other infoschemata which the person considers to be relevant to the task or challenge at hand. Teachers must help students acquire and use complementary infoschemata and to reflect upon and actively reconcile differences between incompatible infoschemata in situations where they may both be relevant and activated.

k) Infoschemata provide the information basis for each person's cognitive-beliefs; hence, infoschemata are an integral part of each person's cognitive-belief system. Each individual does more than construct clusters of infobits, combine them into related sets, and use these infobits to influence and guide thinking, learning and behavior. They decide the extent to which the infobits they have and the conceptions they form about the world and self are true, valid, and representative of the way things really were, are, have been, and should and ought to be like. When these decisions are made, added to each infobit, cluster, and infoschema is an intangible quality representing the degree to which the person accepts each as being right, true or valid. This quality serves to prioritize the infobits, clusters, and infoschemata with those accepted as most true, valid, and descriptive of what was, is, has been, or should be having more influence on thinking, deciding, learning, and acting than those held at lower levels of acceptance. In effect, each permanently stored infobit and infoschema become(s) the content of each person's cognitive-beliefs.

Table 2.

Additional characteristics and features of an infoschema.

a) Each infoschema operates most often below the *threshold-of-consciousness* level.

b) The extent to which an infoschema will intrude upon and dominate one's sense making and interpretation of events, phenomena or data is impossible to predict beforehand and to measure and assess accurately afterwards.

c) Infobits in infoschemata as well as infoschemata themselves are drawn upon to recognize, confirm or make connections between what is already "known" and what is being encountered and considered.

d) Adding to, preserving, modifying and maintaining existing infoschemata are just as important as building new infoschemata. In some cases, these may be more functional and important than constructing new infoschemata.

e) Existing infoschemata and the infobits contained within them, not prior experiences, are drawn upon and used to function in and make sense of the present, to reflect upon past occurrences, and project into the future.

f) Infoschemata may be applied to distort, modify, ignore, or forget information, events, etc. in order to enhance affectively pleasant or desirable states, perceptions or data and to reject, deny or forget affectively unpleasant or undesirable states, etc.

g) The associations among clusters of infobits within an infoschema and between infoschemata and among infoschemata may be fixed as well as changing and evolving networks of linkages and connections that each learner forms and uses to organize the information which makes up his or her knowledge base about the world and self.

h) An infoschema may be constructed and applied to deal with an immediate and temporary situation or phenomena without either that infoschema being permanently stored or bringing about major changes in existing permanent infoschema. This is to say that learners just don't build infoschemata in permanent storage.

i) An infoschema is an abstract structure of infobits, clusters of infobits, and their interrelationships.

j) An infoschema is a conceptual and perceptual scanner and filter for assigning meaning to and interpreting the world and self; it does not function as a simple recording device.

Individuals are born with the capability of forming, constructing, refining, altering, integrating, augmenting, restructuring, correcting, repressing, and storing infobits, conceptions and constructions. Consequently conceptions and constructions within and among learners vary in their adequacy, completeness, depth, content, structure, correctness, functionality, the extent of their interconnections, and the extent of their past use. People continue to add to existing conceptions and constructions throughout life although they may not modify important information that serves as the prevailing structure and emphasis of each.

From birth each person constructs thousands of interrelated clusters of infobits which are arranged and grouped to form sets of interrelated clusters. Indeed, humans cannot prevent themselves from constructing infoschemata or using them to comprehend, assign meaning to, and make decisions about new experiences and data. For this reason, there is no such thing as an "immaculate perception" or "immaculate conception of the mental kind" (Stahl, 1979, 1987, 1991). In and out of the history classroom people use their infoschemata concerning past occurrences (a) to reconsider, reinterpret, reconstruct, or inquire further into artifacts and data about and from past occurrences as these things are perceived and remembered and (b) to predict and describe possible future occurrences or data.

Helping students build appropriate infoschemata concerning past occurrences for in-class use does not automatically affect "shadow" infoschemata they may have constructed and still use in out-of-school situations. In history/social studies classrooms, students must be helped to construct and then use discipline-grounded infoschemata to make appropriate and meaningful adjustments in and additions to conceptions and versions of past occurrences. This assistance is more educationally sound than activities that allow students to construct and use alternative infoschemata which they view as only being relevant to in-class success. The generation and use of school-linked infoschema is one major reason why students often fail to "transfer" in-class constructions to out-of-class situations as well as to making sense of other occurrences and data studied in the same class.

If students are to possess and use the information bases, abilities and orientations associated with valued goals of history education and with having *"good" history* in their minds; they must construct, refine, rehearse, store, and use relevant and adequate infoschemata about such things as past occurrences, the nature of history and historical inquiry, and methods of historical inquiry. Furthermore, they must accept that appropriate self-constructed "historical infoschemata" and the information these contain are necessary and valuable things to hold and use.

Many of the roles and functions as well as all of the "power" of constructions and their associated infobits are the result of decisions individuals make concerning the extent to which they accept each infobit, conception and construction as being or representing what is actual or certain.[44] The more that a person accepts these as representing what is certain and actual, the more influence the particular infobit, conception or construction is likely to exert on internal information processing events. Because of the association between infobits and beliefs, the next section describes cognitive-beliefs and the roles they play in thinking and learning.

Cognitive-Beliefs

Individuals are certain, confident, tentative, or uncertain concerning each infobit, infoschema, and construction they hold. This self-attached acceptance as to the certainty of actuality of something is referred to as the acceptance weight of a belief. Each person decides the extent to which she

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44 The IC position is a psychological rather than a philosophical view of thinking and learning. The I-C does not accept the notions of truth, validity, good, reality, and knowledge as these are defined within the domain of philosophy. The terms "certain" and "actual" are used to denote what a person may accept as the basis for forming and adhering to a belief.

accepts encountered and invented infobits, conceptions and constructions--and what these each represent--as being the way things actually are, have been, and should be. Each construction and its attached acceptance weight constitutes a cognitive-belief. In other words, once a person decides how certain or actual an infobit, conception and construction is, that person generates a cognitive-belief. Each person also decides on how certain she is as to whether each thing (e.g., person, occurrence, action, reason) that is represented by this information is an actual thing. For instance, a student who believes in UFOs accepts the information about them as being correct and is certain that vehicles from outer space exist and have visited this planet. Students assign an acceptance weight to every infobit, infoschema or set of infoschemata they have acquired and have available for use in history courses.

As a required part of assigning meaning to each infobit and construction, people nonconsciously attach to each a value weight that represents the extent to which they personally accept that information as being an accurate description of what is or was as well as what is not or was not. Each decision reflects the extent to which they are certain that what is being described by or included in this information is the way things actually were, are, should be, will be, or should have been. Thus, when a person says he "believes something," what he is saying is that he accepts with certainty that what is being considered actually was, is, might be, or should be.[45] The stronger the acceptance (i.e., the greater the "acceptance weight" assigned), the stronger a person's belief is said to be. This acceptance weight is an independent quality that is nonconsciously determined and then automatically attached to every infobit, conception and infoschema. People are not very good at accurately describing the actual weights they have assigned to things.

This acceptance weight of a belief is not the same as the information base (or content) of a/the belief. The content of a belief is the actual information that is accepted with some degree of certainty. This content is usually expressed as a proposition that may or may not accurately reflect actuality and is usually indicated by expressions of "I believe that . . ." rather than "I believe in . . ." (Klausner & Kuntz, 1961). In every case, whether a person believes that something or in something, the strength, test or criterion of a belief is typically consider to be what the person chooses to do about it in the form of public actions. Philosophers have asserted that to believe in something implies a willingness to act in ways consistent with what the individual accepts to be certain and with certainty. The stronger the belief actually is, the stronger the commitment to act is assumed and expected to be.

Besides those a person intuitively invents for herself, there are several sources, justifications and defenses for acquiring, adhering to and maintaining beliefs. These sources include but are not limited to: tradition (including folk superstitions, folk myths and culture), authority, common sense, sense experiences, intuition, and reasoning.

A subset of the information base of one's cognitive-beliefs includes those statements that express what it is that one accepts or rejects with a high degree of certainty. The content of these beliefs, when made public, is often provided as a list of statements describing what the believer accepts or rejects. These statements of what is accepted with certainty, as pieces of information, are labeled belief statements.[46]

People can study, consider, store, and even use belief statements of others without ever accepting them as being their own beliefs. If this were not so, then it would be impossible to study

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45 This also happens when individuals say they "don't believe" in something. What they are actually saying is that they do not accept what is being seen, said, or described as being real, true, or valid. One may say that they accept it as being what is not real, not valid, and not true of what was, what is, or what could or should be or assign little concern to its validity, truth or realness.

46 This label, belief statements, is different from and preferred over the label, information beliefs, that was used in earlier writings by the author.

the belief statements of a religion other than one's own without immediately converting to that religion. Therefore it is possible for students to study and learn the belief statements of any group, such as illustrated in the Nicene Creed or Andrew Carnegie's "Stewards of Wealth" manuscript, as items of information without personally accepting them as their own way of thinking, much less as their own beliefs. Indeed, students may even comprehend, recall, and use for analytical purposes sets of stated beliefs, such as the doctrine of "Social Darwinism" or "Laissez Faireism," on a level superior to that of an actual believer. What distinguishes them, as students and inquirers, from "true believers" is that these believers strongly accept with certainty that these statements are accurate descriptors of what actually was, is, and shall be (Stahl, 1987; Stahl & Casteel, 1990).[47]

A detailed description of all the features, roles and formation activities associated with cognitive-beliefs is beyond the scope of this article. The full range of characteristics of cognitive-beliefs and the organization of these beliefs to form what is referred to as one's cognitive belief system cannot be listed here. Tables 3 and 4 list characteristics that are especially relevant to constructing history and history education. These are described here primarily in terms of a pastologist to fit the context of this paper. These characteristics, however, are applicable to every person and to every cognitive-belief one has generated or could generate and use.

Tables 3 and 4 about here

Humans cannot process data, construct, or apply conceptions or constructions, recall the past, or make decisions unless one or more infoschemata and cognitive-beliefs are activated. Infoschemata are not activated and dynamic on their own initiative. Each person is constantly selecting and activating, almost always nonconsciously, particular infobits from one or more infoschemata to deal with just-encountered information, situations and materials. These decisions as to the particular infobits and infoschemata that are to be activated are directly linked to the acceptance weights assigned to them and the need for their use at the moment as determined by the individual.

For many students constructing and adhering to conceptions of and about past occurrences requires them to confront and process information contrary to what they hold. Forcing them to confront such data is not always the most effective means to facilitate appropriate changes in their constructions or conceptions--or their beliefs about them. They may perceive these incompatible data and confrontation situations as psychologically distressful events. Students may experience psychological distress when they perceive a situation as threatening to their vital interests and most cherished beliefs. Under these conditions a functional impairment in their normal cognitive processing abilities is likely to occur and endure. Their perceptions and interpretations of phenomena and information will become highly selective, self-centered, narrowly-focused, and rigid. They immediately become less able to consciously control distortions in their thinking processes or the results of these processes, to concentrate, to recall accurate data, or to reason logically. In such cases, what they would normally rely upon to test their conceptions of truth, reality, viability, and validity and to refine or modify their existing conceptions become quite limited and less effective.[48] If teachers use inappropriate curriculum and instructional approaches intended to force students to confront and reject existing infoschemata and quickly replace these with more adequate ones, they are likely to find students very resistant to changing their present conceptions, constructions, and interpretations.

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47 Also see Eric Hoffer's The True Believer (1955) for an expansion of ways a person's beliefs may affect his or her decisions and actions as well as of reasons why individuals may come to "truly believe" in some thing or some person.

48 The concepts of "truth," "reality," and "validity" are used here because these concept-labels refer to what most people are certain exist and therefore consider in some ways during their thinking activities.

Table 3.
Characteristics of cognitive-beliefs with elaborations.

a) The assignment of an acceptance weight to an infobit, cluster of infobits, infoschema or some thing occurs unconsciously; a person never consciously knows the actual degree of his or her personal acceptance of what is believed in. Although they are continually assigning acceptance weights to infobits, conceptions and constructions, individuals never consciously decide what they actually will accept as true, real or valid even though they may "think" they are doing so at the time.

b) The strength of a person's belief (i.e., level of acceptance) can be just as great as the strength of his or her non-belief or disbelief (i.e., level of acceptance that some thing is not true, real or valid). Individuals can decide to believe some thing is invalid, untrue, and not real just as strongly as they might believe some thing is valid, true and real.

c) The greater the strength of a person's belief or disbelief, the greater influence the information attached to that belief will have on other components and operations of the human processing system. The more an individual believes or disbelieves something, the more s/he will use the information base (or content) of that belief to influence: (a) how new information is interpreted and constructed; (b) what information is attended to, selected, processed, acquired and forgotten; (c) what meanings are assigned to new and old information; and (d) what decisions, actions and feelings emerge as a result of the processing events.

d) The greater the strength of a person's belief, the more difficult it is for the person and the instructional environment to modify the belief or alter the information base of that belief. Individuals like all people tend to preserve their strongest cognitive beliefs such that they actively work unconsciously and consciously to keep strong what they already accept to be true, right, real, valid or beautiful. This is a major reason why a person's biases and prejudices are so hard for the person to change, much less to eliminate.

e) At a particular point along the continuum of acceptance (i.e., the "threshold point"), the quality and amount of information and internal processing that is needed to get an individual to change his or her perspective and level of acceptance weight will be far greater than were this weight below this level. For beliefs that are held at or above a particular strength, it takes a great deal more contrary information and internal processing over a longer period of time to enable a person to change his or her beliefs than were these held less strongly.

f) The stronger the belief, the greater will be the tendency to align other relevant infoschemata to be consistent with what the individual strongly accepts to be so. Individuals who hold a particularly strong belief in one thing tends to support this belief by linking its information base to related infoschemata, even modifying their existing conceptions and constructions so that they become more consistent with the belief than they were earlier.

g) All the beliefs an individual holds are arranged such that a limited number are held with exceptional strength while most are held with a minimal level of acceptance; this hierarchy-like structure is a construct labeled the cognitive-belief system. All information and all infoschemata in an individual's permanent set of infoschemata are not assigned the same weight. Some infobits, clusters and infoschemata are accepted as being especially true and valid. This in no way means that infobits, conceptions and constructions assigned minimal weights are less meaningful, useful or used than those which are strongly believed in.

h) Only the individual can modify his or her personal beliefs, make changes in his or her cognitive-belief system, and alter the information that forms the base of his or her beliefs and disbeliefs. All of these may occur as a direct result of information processing activities that can only take

place inside the indivdual. The teacher, a set of information, or tasks cannot force a student to believe or not believeor to change a belief.

Table 4.
Additional features of cognitive-beliefs and the cognitive-belief system.

a) is generally stable.

b) is prioritized; i.e., particular infobits and infoschemata are considered to be more important than others with the highest "ranked" beliefs being the most dominant and pervasive in influencing one's thoughts, perceptions and actions.

c) is hierarchical; i.e., each is organized and structured in hierarchical order with few beliefs held extremely highly with many beliefs held at lower levels of acceptance.

d) is evaluative; i.e., they include standards as to what is good, worthwhile, beautiful, moral, etc. from the person's own perspective

e) is individual and idiosyncratic; i.e., each is established by the person to represent his or her ways of viewing the world and self as he or she perceives them to be.

f) is multifaceted; i.e., contains information and acceptance weights and their interconnections.

g) continues to expand throughout life.

Cognitive-beliefs influence learning about past occurrences by both facilitating and inhibiting the processing, storage, and use of appropriate infobits and infoschemata which encompass conceptions of, constructions of, and abilities to "do" history. Strongly-held beliefs of appropriate conceptions and versions cannot be wished into existence; strongly-held disbeliefs of appropriate conceptions, constructions and perspectives rarely disappear easily and rapidly. If students are to function as we would like in the present and in future situations, they must assign positive acceptance weights and use discipline-based historical infoschemata aligned with abilities, orientations, and behaviors as reflected in the outcome goals of history education.

In the history classroom, students must have time to (a) consider the information they encounter; (b) reflect upon the use, contents, and viability of the information they already possess; (c) reflect upon the information and things they accept as being real, true, and viable; and (c) consider the extent to which the data and materials they are encountering and the infobits and conceptions they possess are related and consistent (Stahl, 1989; 1991). As described earlier, facilitating student acquisition and correct use of appropriate historical infoschemata are not merely a matter of getting large quantities of the "right" information to them in oral or printed forms. Learners must be helped to actively consider this information in appropriate ways so that they can assign appropriate meanings, acceptance weights, and orientations about past occurrences and studying the past.

New information, stimulating presentations, new curriculum and teaching models, different resources, and exciting activities in and of themselves are rarely sufficient to enable most students to acquire appropriate or change inappropriate infoschemata and corresponding cognitive-beliefs. Furthermore, providing students with appropriate infobits, documents, timely cues and prompts, and appropriate feedback within less-than-optimal curriculum and instructional conditions generally will have little positive impact on enhancing or modifying student cognitive-beliefs about past occurrences and the study of the past.

Proper instructional environments can significantly increase the likelihood that students will consider and acquire appropriate infoschemata and accept them as valid ways to consider, perceive, interpret, and explain past occurrences, artifacts and data both inside and out of the classroom. Unless such environments are established and maintained, students will continue to leave history classrooms with infoschemata and cognitive-beliefs which are far from what they could have attained.

The Information-Constructivist Perspective of History

The I-C view accepts the past as consisting of two dimensions: the temporal and the inclusive. The *temporal* concerns time itself, i.e., all time prior to the present. In this sense, to study the past is to study time, and historians and others in the social sciences have never been too much concerned with time itself. Rather, they are concerned with what took place during past times which is the focus of the *inclusive* dimension concerns all prior discrete, unrecoverable, nonrepeatable, and unalterable occurrences that actually happened in time, space, place, and context as they actually happened. This dimension also includes the artifacts, records, etc. that have survived to the present regarding what happened before the present.

The practice of history and the study of past occurrences take place only within the mind of persons engaged in constructing versions (including interpretations and explanations) of targeted past occurrences. All historical accounts are merely generated versions of past occurrences constructed in a person's mind. In other words, history occurs when and only when people invent and construct a version of past occurrences in their minds regardless of whether their versions take the form of narratives or are written. They can never reconstruct actual past occurrences in a physical sense as they actually occurred. This point is why the IC asserts that "history does not exist until someone invents it" and that "history does not exist independent of the mind." People may, however, reenact their histories of past occurrences as they believe these to have been.

To construct adequate histories, people must be committed to:

a. constructing versions of past occurrences as closely as possible to what happened and how things occurred, acknowledging that this construction can only occur in the mind of people in the present;

b. using discipline-based concepts and methods of inquiry, verification and interpretation as the means to find, select and treat available evidence about targeted occurrences;

c. describing and reconstructing past occurrences in the most likely sequence and importance that can be derived from the relevant physical evidence;

d. interpreting past occurrences, individuals, and things within appropriate contexts and using appropriate conceptions;

e. determining the significance of the occurrences or entities that have been targeted; and

f. generating the most probable and defensible explanations for why things occurred as they did in the manner, sequence, place, and time that they did.

These elements provide the foundation upon which sound instruction in history can take place.

What is an "occurrence" and an "event"?

Historians are rarely concerned with the time per se. They are concerned with what actually took place at particular moments, during a particular time period, or over time. History as everything past refers to the temporal dimension of occurrences and encompasses all past occurrences. In history courses, these occurrences rather than time are the focus of study. While things happened in the past and happen in the present, things do not occur or happen as events in and of themselves. The meaning of this last statement will be clear as the distinctions between occurrences and events are presented below.

An ***occurrence*** is any discrete thought, behavior, emotion, or phenomenon that happens or happened at some moment, context and place. An historical occurrence is anything that has to do with what took place in the past, is an actual completed self-contained unit of thought, behavior, emotion, or phenomenon, took place at a particular moment in particular places, and is something ephemeral which vanishes forever. In this sense, history as everything past includes all prior occurrences to the present. Each occurrence has its own unalterable content; a structure, a beginning, and an end; and constitutes the raw object of inquiry and in reconstructing the past as it actually happened in the way that it happened.

Like raw data, documents, and artifacts; discrete occurrences have no inherent meaning or objective existence. Each occurrence is assigned meaning by those who have a description of it. These meanings are often associated with meanings assigned to other occurrences happening prior to and after a targeted occurrence.

An ***event*** occurs when a person selects and assembles a number of discrete occurrences and treats this collection as though it were a self-contained whole. Every event is constructed in the mind with the selection, organization, and emphasis based upon guidelines for considering, inventing, and conceptualizing numerous separate occurrences as though it were "one occurrence." These guidelines also allow a person to determine when a particular event started, what things and persons are included in and excluded from the event, where and when the event occurred, when and where the event ended, and what is relevant or irrelevant to the event.

Historical events do not exist "out there" to be discovered and studied. The do not occur in an objective, independent world, thus occurring independently of the human mind. Events cannot occur outside a person; they can only occur inside the mind when, where, and as the person chooses for them to happen. Therefore to study an historical event, a person must first invent it for his or her own.

The IC conception of what constitutes an historical event does not determine the structure and order of the event's contents or meanings. Rather, it establishes the parameters of start, end, place(s), actions, and time so that efforts to reconstruct what happened and to describe the event's contents and the order of the separate occurrences can proceed within the context of these parameters. For instance, to study and reconstruct the event called "Custer's Last Stand," it is necessary that a person determine when the series of occurrences in this "event" began, the place(s) where these occurrences happened, the time period in which these collective occurrences took place, and the moment or approximate time when this "Stand" as an event ended.

No one held up a sign in the Black Hills in 1876 that announced: This action and moment start an event that will be called "Custer's Last Stand." Instead, like all past events, individuals at a later time selected from the numerous actions that occurred along the Little Big Horn that summer the ones that were closely interrelated, in close time and space proximity to one another, and could be linked to a particular focus and sequence such that all of these could collectively be treated as one whole or event known today as Custer's Last Stand. Custer's last stand did not exist until the mind invented it--and reoccurs every time an individual constructs a version of these occurrences or retrieves the version already constructed.

Each person determines the particular factors that will unify discrete occurrences to form an event. In every instance, one has reasons for the inclusion and organizational decisions that invented and preserved a particular constructed event. Each should have a persuasive reasons as to why the occurrences included were selected. These reasons should allow one to distinguish the occurrences selected from occurrences, artifacts, etc. that are excluded from the targeted event. In the case of Custer's Last Stand, one should have reasons that support the selection of one occurrence as the beginning of this "Stand" that makes this occurrence clearly a part of the event whereas the occurrence immediately preceding it can be seen as not being part of this Stand.[49]

At all times in the past, each separate occurrence, as an isolated, discrete happening, made little sense to those at that very moment and to some who have studied each occurrence as a separate action, statement or phenomenon. However, combining separate occurrences into a reasonable, "whole" set of occurrences (i.e., an "event") that fits a particular context or perspective enables one to make more adequate sense of targeted past occurrences. In studying past occurrences and in constructing and explaining what occurred as things actually happened in the way they happened, people must take discrete occurrences and place them in relation to other occurrences to form a meaningful set of occurrences referred to as a "whole event." Ideally, the event constructed in the mind is an adequate version of what did occur. Table 5 provides a list of additional characteristics of any event constructed about past happenings.

Table 5 about here

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[49] In another example, when we speak of the Salem Witch Trials as an event, we rarely consider that a large number of discrete occurrences were selected, assembled, sequenced, and described at a later time such that a particular set of temporal, interrelated occurrences as a whole is able to be treated, labeled, and described as though it were one single unified activity with an identifiable beginning, end, sequence, place(s), time and context.

Table 5.

Defining attributes and characteristics of an event as an invented, construed, and assembled construct: A nonexhaustive exploratory listing

Each event

a) has a time reference (i.e., a place in time)
b) has a beginning point (or occurrence)
c) has an end point (or single last occurrence)
d) occurred over a finite length in terms of time
f) has a unifying element
g) has unity, at least for the constructor at the moment of its construction
h) occurs in/at one or more places
i) occurs in one or more contexts
j) occurs after or following, but not necessarily because of or caused by, the occurrence(s) that immediately precede it
k) occurs prior to all occurrences that follow its end
l) has meaning to its constructor or creator at least at the moment of its invention
m) includes activities and/or actions involving one or more entities and usually one or more individual humans
n) is not necessarily permanent
o) is not necessarily an actual set of occurrences
p) may or may not consist of actual occurrences
q) may or may not consist of occurrences in the order they actually occurred
r) may or may not consist of occurrences described in the way they actually occurred
s) is not necessarily correct
t) is not necessarily complete
u) is subjectively determined
v) occurs only once and is not repeatable even for its constructor
w) exists only in the human mind and never independent of the mind
x) occurs in the manner and order in which the learner constructs it
y) has no inherent meaning
z) must be given meaning by the constructor and anyone who encounters this construct
a) is treated and can be treated as a single whole
b) has a chronology in that the occurrences included within it can be sequenced chronologically
c) must be justified as a construct worth attending to

When an event is constructed or reconstructed, decisions are made by people in the present as to what separate occurrences will be included, when the event began and ended, where it took place, how long the period of time was from its start to end, and what the sequence of separate occurrences which took place within it was. The boundaries that are established enable them to study past occurrences as distinct "whole versions" as though there was one large scale, long single occurrence. Only in recognizing these boundaries can individuals study what occurred prior to, during, simultaneous with, overlapping, and after the particular "event" selected to be studied and described. It is also possible to assemble a number of distinct "events" to form a longer, more complex, and more detailed construction of the past.

In many instances, there is no denying that particular occurrences actually took place in the past. One concern is whether the "whole set" of occurrences as constructed as a single event was perceived as a "whole" at the particular time being it was supposed to have happened or is just a heuristic invented in the present. For purposes of illustration we might ask: "Did the members of the 7th Cavalry know at the moment they first sighted the Indians near the Little Big Horn that they were already involved in Custer's Last Stand?" or "At what moment did the individuals involved in the series of occurrences around the Little Big Horn in 1776 realize they were involved in 'Custer's Last Stand'?" Perhaps some did realize the nature of the situation later that afternoon, but the point here is that when pastologists speak of the "Stand" (or the "Battle of the Little Big Horn") as an historical event, they refer to a whole series of separate occurrences that collectively have meaning as a "whole." This series is based upon evidence of what occurred including eyewitness accounts, paintings, and artifacts. The human mind, however, had to determine the cut-off between those occurrences that belonged and didn't belong in this set.

All individuals, as they seek to make sense of all of the known and unknown occurrences of a particular time, determine the boundaries for each event based upon available data, the methods of historical inquiry, verification and criticism, and their own interpretations of these data.

An event, as a set of mind-invented discrete occurrences, is constructed for the purpose of making sense of and giving meaning to the multitude of occurrences that happened or are perceived to have happened. The past cannot dictate what occurrences fit into an event nor can the data and artifacts available about a period or occurrence make these decisions. An event, like the Salem Witch Trials, is considered an event because one or more persons decided that particular occurrences at this particular time had certain relationships to each other such that collectively they should be treated as a distinct set. This set is invented and constructed internally as a normal part of each person's information processing system. This is why we can say that past events are invented, created, and constructed in the minds of people whereas the occurrences which are included in each event are usually actual and authentic.

Each person including each teacher builds, refines and revises the version of each event she or he constructs, often weaving separate occurrences into a sequenced narrative which tends to lead one to lose sight of the myriad of separate occurrences and to view them as though only a single event took place. At other times, an event can be so large (e.g., World War II) that it is subdivided into shorter events (e.g., particular battles).

An historical event then is a mind-constructed composite of discrete reconstructed occurrences; a composite constructed in the present as a part of the person's effort to reconstruct past happenings to make sense of the numerous occurrences in the context of their time, place, context and culture. Even the label assigned to describe the event is mind-made. The sequence of the separate occurrences as they "took place" is typically chronological and is used as the basis for sequencing what happened and how it happened.

The IC perspective recognizes that people may invent quasi-historical and ahistorical occurrences and events to represent, describe, or "be" the past that they perceive or believe it to

have been. These inventions may have little in common with past occurrences as they happened or with the data about and artifacts from a particular past situation, activity or behavior. Like evidence-grounded constructs, these events have structure, are represented internally as organized sets of interrelated information about a particular happening, and are meaningful to the person. However, unlike appropriate historical constructs; the structure, contents, and sequence of occurrence in these events are invented by the person to meet his or her own purposes and exist independently of the targeted occurrences as they actually happened. In other words, what people construe as having happened may have little resemblance to what did happen as it happened. Historical fiction novels represent quasi-historical or ahistorical versions which are constructed by their authors to meet the needs of the marketplace.

Inventing and Learning *History* in Classroom Settings

To learn adequate histories in classroom settings requires students to actively complete a variety of internal information processing tasks that invent a conception and version of targeted past occurrences that approaches as nearly as possible a 1 to 1 match with what actually occurred. These tasks also require students to generate appropriate interpretations, causal explanations, and justifications of significance. To be successful in this effort to make a complete history in their minds ultimately requires students to complete at least the following tasks:

(a) encounter and acquire a set of descriptive details of actual occurrences as derived from the available physical evidence and accounts;

(b) use discipline-based methods of inquiry and verification to make sense of and assign meaning to the evidence and data from and about the evidence and the occurrences which the evidence represents or suggests;

(c) apply discipline-based or sound stipulative concepts to shape, comprehend, make sense of, and organize the data and interpretations from and about these occurrences;

(d) arrange these details in some logical and defensible sequence, usually in chronological order;

(e) express the findings in an acceptable narrative form;

(f) select a topic or label for each event being reconstructed and for each concept being emphasized;

(g) determine the self-generated set of delimitations revealing the parameters of each event, thereby making each event exclusive and inclusive while delineating it in time, space, content and context from all other past events;

(h) distinguish and state interpretations which are inferred from and imposed on the evidence, details, and occurrences as by-products of "sense-making" and "assigning meaning" internal processing activities;

(i) generate descriptors that place the events and interpretations in context and in relation to one another as well as to fill in the gaps between the facts so that a complete version of the series of occurrences is constructed;

(j) articulate a causal explanation that describes and justifies the most important contributing factors that brought about the each event as it happened when and where it happened;

(k) determine one or more reasons why each event is significant or important to other events that occurred prior to or following it; and

(l) determine one or more reasons why each event is significant or important to construct, study and preserve in the students' mind.

Each of these tasks represents numerous decisions which are rarely made in the order listed above. Each individual rarely makes all of the decisions in one of these areas before making decisions relative to one or more other areas. These decisions are made over a period of time, are interactive and interdependent, and are subject to change more than once. Of great importance, the person always makes these decisions under the influence of existing infoschemata and beliefs.

The teacher of history is responsible for helping each student to engage in and successfully complete the above tasks so that "history" is constructed and can be learned.[50] This responsibility is very different from covering, studying, and insisting students retain intact the histories that others have constructed. To be successful, the history classroom must be an active workplace where students are constantly interacting with evidence and sources of data toward constructing their personal versions of past events and generating meanings for these events relative to other events and to their own lives.

To "do" "good" history means a person is generating, inventing, constructing, verifying and storing a self-constructed version of past occurrences such that she or he possesses a "picture" in his or her mind of the events as they actually happened within the context of the time, place and situation in which these occurred as much as is possible -- and for the reasons each event and its inclusive actions took place in the manner and order in which they happened Furthermore, this history is built from discipline-based concepts and methods of inquiry and verification.

It is not difficult for people to construct their own personal versions and conceptions of and about past occurrences, people, artifacts or actions. Indeed, it is quite natural for people to do so and impossible to prevent. However, what needs to happen is that they go about their constructive and interpretive tasks applying particular methods of inquiry, verification and criticism to available documents, artifacts and data. Using these methods as tools within a community of peers that also uses these same methods, individuals are likely to invent sound, meaningful histories that are aligned with past occurrences.

Many key elements relative to the Information-Constructivist perspective of thinking, learning and acting have been introduced along with solid examples that should be practical to social studies educators on all levels. Two major components of the perspective, infoschemata and cognitive-beliefs, were described. These not only represent what humans have invented, store, use and believe; they have great influence on how humans assign meaning to, make sense of, conceptualize, and construct personal versions of what each person encounters in the world.

The IC perspective was used as a framework and context for answering critical questions concerning the nature and study of history, including defining history, an occurrence, and an event. Finally, a limited number of applications and implications of the IC perspective for history educators and learning in and of history were described. While the above example stressed "history," the major concepts and ideas associated with the IC perspective are applicable across all of the social and behavioral science disciplines. Each field and discipline must accept its very existence as the product of constructs invented within the human mind. Finally, as revealed above, "history" does not exist in nature or in the natural world independent of the human mind: it existed and exists only when and to the extent individuals construct it. This statements alone has tremendous implications for how teachers need to approach the teaching of history and any of the disciplines in the social studies.

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50 It is important to note that merely because one constructs a "history" does not mean the person will automatically learn (i.e., permanently store) the information content of that history. Other internal processes need to occur before constructed histories become stored histories.

EPILOGUE

To restate an earlier conclusion, the above report reveals that many assumptions and conceptions associated with one or more cognitive psychology perspectives are widely accepted and advocated within as well as across the social and behavioral sciences -- the academic content bases which are most pertinent to social studies educators. Consequently, one would assume that social studies educators would want to acquire and master the use of the foundational assumptions that scholars in the respective academic fields believe and use and would expect individuals within each field to be disciplined in these assumptions and relevant methodologies.

Representative Reasons Why a Failure to Comprehend, Accept and Use Cognitive Psychology Conceptions and Assumptions Would Likely Interfere With Student Success in Attaining Desired Outcomes of Social studies Education

Suppose a social studies educator did not accept and apply contemporary cognitive psychology assumptions and conceptions, what conceptions might she or he hold about cognition, learning, and instructional events? The chances are great that this person would assume that:

a) "knowledge" exists outside the learner in such things as the textbook, resources, and teacher lectures; and that to acquire and have knowledge merely means students would have this information in their brains or "minds" in pretty much the same form and sequence as the information encountered in these sources.

b) students can "absorb" the external "knowledge" by being directly told or shown it so students can transfer this information and external meanings straight into their brain or "mind."

c) what students "know" is correct and complete to the extent it matches external "knowledge" as teacher perceives this "knowledge" to be: this "knowledge" usually consists of information identical to, or at least similar to, the near-verbatim information students encountered and were to have stored from class tasks and resources.

d) students "know" when they accurately reproduce the external information in light of each teacher's standards of accuracy.

e) students who cannot absorb or directly transfer the external information and meaning into their brain have learning problems that most teachers and students can do little about.

f) many more students could learn much more if they just spent more time and effort learning.

g) "motivation" can be provided by outside sources, directly transferred into students by these outside sources, and absorbed by students who are ready to be "motivated."

h) what constitutes praise, rewards and reinforcement is determined by solely external criteria rather than internally by each student; and that certain things, such as saying "good" as praise, will automatically serve as praise, rewards and reinforcement irrespective of the meanings students assign to them.

i) students will automatically make large "leaps" in their comprehension, understanding and valued "thinking skills" once they have stored and can recall a sufficient amount of the correct, near-verbatim subject matter information.

j) what is really meaningful is determined either by the teacher, individuals who contributed to the course content sources, such as textbook authors or "historians," "geographers," and other social or behavioral scientists; or others rather than by each individual learner from his or her own perspectives.

k) *real* or *true* "history," "geography," "sociology," "citizenship" and so forth exist outside each learner and is independent of any person's interpretation, construction and subjective biases or perspectives.

l) the closer students' meanings come to that determined either by the teacher or by individuals who contributed to the course content sources, the more *correct*, *true*, or *realistic* the students' views and knowledge are: hence, the more intact information students retain and recall from their studies, the more knowledgeable and successful students will be.

m) because the information, interpretations and meanings that are worth knowing and using are contained in external sources, the more time students have to observe, listen to and study these sources and the less time and opportunity they have to interpret and reflect upon this information and sources, the more effective learning and instruction will be.

n) what is to be studied and acquired in social studies classrooms is to conform to some external standard that exists independent of and holds priority over local school or school district guidelines; hence, to be a "good" teacher is to "*cover*" and accomplished what is expected to meet this external standard, regardless of what students actually attain as a result of these activities.[51]

o) until students have *covered* and can recall enough of the relevant details of the events, objects, persons, situations, etc. being studied, their interpretations and perceptions have little credibility and are of little value to anyone, even those students.

If teachers were to follow these assumptions, they would very likely plan for and carry out instructional situations and assess students' success in order to ensure that students stressed the acquisition and recollection of externally-selected data and interpretations with an accompanying de-emphasis of their own interpretations and constructed versions of what was studied. Furthermore, there is likely to be mistrust, if not disbelief, that students are able to generate accurate data-based and appropriate interpretations on their own. In other words, the meanings and versions students were able to generate would be acceptable to the extent they matched those of their teacher or course referents.

Adherence to these assumptions and their corresponding practices and failure to accept the cognitive psychology conceptions proposed here would mean that social studies teachers would continue to minimize, ignore, or reject the importance of each student's constructed versions and interpretations while strongly favoring teacher or external other(s) provided data, meanings, priorities, and interpretations.

The Cognitive Psychology and Information-Constructivist Perspectives: Perspectives Not to Be Ignored Within the Social Studies

As an active, continuously processing learner, each student constructs and stores a personal version of the world, things in it, and self which represents his or her personal reality. This construction occurs in reference to academic concepts and materials such as in history, geography,

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[51] This does not imply that social studies educators should reject or ignore all guidelines, etc.

sociology, and psychology as well as to everyday situations and matters such as self, community, one's peers, and what one does and should do in school settings.

Three points are vital to the Information-Constructivist view.

- The events and phenomena about which a student studies and with regard to which a student acquires, stores, retrieves, and uses information are typically actual events and phenomena, most of which exist and take place outside the learner. There is an external world, and students must form personal representations of this world within their brains and information processing system.

- Each student, like each adult, personally "makes sense" of his or her objective world and his or her place in it. This involves a subjective assignment of meaning, worth, value, "truth," and "validity." An individual cannot prevent this assignment of meaning which occurs constantly and usually nonconsciously within the learner at all times.

- The external world and the invented, subjective world interact insofar as information from and about both are activated, transformed, treated, and integrated inside the learner as she or he guides these processing events. As this interaction takes place and as a direct result of this processing, each student constructs a personalized version of the world, self, and the relationships between the world and self. Consequently, each learner is continually in the "construction business," with the results being very influential in determining what will be and will not be learned in and about the social studies.

Social studies educators must see their task as helping students to assign meaning and make appropriate sense of what is being considered and then to construct, permanently store, and apply appropriate versions of these things when and as needed. Consequently, social studies educators can no longer emphasize presenting large quantities of subject matter infobits to students for them to "absorb." We must see ourselves as providing the raw materials and an environment whereby students attend to, select, store and use infobits to construct powerful, useful and social science-based versions of the world which they can use to learn, decide and behave. At times teachers must help students to modify, reconstruct, and even "deconstruct" existing inappropriate versions in order to enable them to generate and construct more appropriate, functional conceptions and perspectives.

In addition to having and using information to guide thinking, acting, feeling and behaving, students assign meaning to this information and what it represents in terms of whether either is real, true, valid, and beautiful. This assignment is personal, that is, it is determined, maintained, and modified by the learner when and if she or he makes these decisions.

As noted at the outset, the position taken in this paper is that presently social studies educators have no viable alternative to accepting a cognitive psychology perspective relative to knowing, learning, and functioning as a human beings in the world. Assumptions inconsistent with this perspective were introduced with their implications explored. From the view presented here, the assumptions that are commonly held about learners that run contrary to cognitive psychology conceptions provide a dysfunctional view of learners and learning that will handicap educators from helping every student achieve what they could attain.

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